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Alliance OF AUTOMOBILE MANUFACTURERS

NHTSA-01-8876-7

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October 16, 2001

By Hand

The Honorable Jeffrey W. Runge, M.D.
Administrator
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Dr. Runge:

Re.: Petition for Expedited Rulemaking; Federal Motor Vehicle Safety Standard No. 208, "Occupant Crash Protection"

This petition for rulemaking is being submitted pursuant to 49 CFR Part 552 by the Alliance of Automobile Manufacturers ('Alliance') on behalf of its members, who are: BMW Group, DaimlerChrysler, Fiat, Ford, General Motors, Isuzu, Mazda, Mitsubishi, Nissan, Porsche, Toyota, Volkswagen, and Volvo. In order to assure the timely and orderly implementation of the "advanced air bag" requirements promulgated at 65 Federal Register 30680 (May 12, 2000) and to allow the development of advanced air bag systems that can help further improve protection for the largest numbers of occupants, expedited action by the agency on this petition is necessary. Action by the agency either granting or denying this petition is needed by November 16, 2001.

The members of the Alliance have been working diligently with the agency and other partners for many years to heighten the public's awareness about the potential risk of injury from deploying air bags and to invent, develop, and implement advancements in air bag technology that can help further reduce these risks to out-of-position occupants, particularly children and small adults, from deploying air bags. Among the actions taken by Alliance members are:

- development of a test protocol to facilitate the rapid depowering of frontal air bags;
- upon NHTSA approval of test protocol, depowering of 60% of frontal air bags within 6 months; 85% within 12 months;
- initiation and funding for the Air Bag & Seat Belt Safety Campaign – a collaborative effort of automakers, major insurance companies, occupant restraint manufacturers, law enforcement agencies, the National Safety Council, the government, and others to reinforce and further spread the message that all occupants should be properly restrained and children should be properly restrained in a back seat; and
- continuing efforts to enhance air bag system performance[1].

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[1] See "Crisis to Progress: 5 Years of Air Bag Safety in America," Air Bag & Seat Belt Safety Campaign, National Safety Council, August 2001

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These actions, coupled with the public's positive reaction to the public education messages about the need to properly restrain children in the rear seat, have reduced the rate of child fatalities from air bags by a remarkable 90.3% between 1996 and 2000. This accomplishment is all the more remarkable because the number of vehicles equipped with passenger air bags tripled over the same time period. In addition, according to the General Accounting Office (GAO)[2], as of April 2001, NHTSA has found that depowered air bags appear to be as effective as previous air bag designs in reducing the risk of injury to occupants, including larger occupants, in medium- to high-speed crashes.

Alliance members are also moving swiftly to help facilitate the implementation of the advanced air bag requirements. Among the actions taken by the Alliance:

- establishment of a real-world data gathering program to provide a greater factual basis for future air bag rulemakings;
- development of two advanced anthropomorphic test dummies representative of a small adult female and a six-year old child for developing and validating seat-based weight pattern sensors used in advanced air bag systems; and
- continued development of a family of test fixtures representative of the various child restraint systems available in the market.

Alliance members are individually expending significant resources towards implementing the advanced air bag rule. As reported by the GAO, Alliance member research and development expenditures on air bag technology are forecast to increase by 375% over 1998 levels leading up to the rule's September 2003 implementation date[3].

In June 2001, the GAO delivered to the Senate Committee on Commerce, Science, and Transportation its report responding to the Committee's request that the GAO, "...report on the development of technologies that vehicle manufacturers plan to use to comply with the advanced air bag rule." The GAO examined the current availability of and planned enhancements to advanced air bag technologies as well as challenges that industry faces in complying with the rule. The GAO concluded that the primary challenge to manufacturers in meeting the requirements in the advanced air bag rule is the development of occupant classification sensors that are accurate, durable, and suitable for mass production. Occupant classification sensors are being developed with the intent of distinguishing among infants and children (as well as their safety seats), and adults in the front outboard passenger seating position. These sensors are necessary to allow the air bag system to provide the appropriate deployment decision: no deployment, low power, or high power – depending upon the type of occupant.

The GAO reported that, "...technologies that are currently being developed for occupant classification sensors, such as weight-based or pattern-based sensors, have not demonstrated the ability to consistently distinguish among various sizes of occupants. For example, weight-based sensors in seats have difficulty distinguishing between 6-year-old children and small adults because a 6-year-old child can appear heavier from additional weight (such as a booster seat and increased tension from a tightly cinched seat belt); additionally, small adults can appear lighter because a portion of the occupant's weight is borne by the legs resting on the floor." The GAO

[2] See "Vehicle Safety: Technologies, Challenges, and Research and Development Expenditures for Advanced Air Bags," Report to the Chairman and Ranking Minority Member, Committee on Commerce, Science, and Transportation, US Senate, United States General Accounting Office, GAO-01-596, June 2001.

[3] Ibid.

further reported that occupant classification sensors had not as yet demonstrated the ability to operate reliably over the full 15-year lifecycle of a vehicle, or to be consistently produced and integrated into vehicles in large quantities.

The GAO's assessment that occupant classification sensors are an important component in advanced air bag systems is consistent with an earlier study conducted for NHTSA by NASA's Jet Propulsion Laboratory (JPL)[4] that was completed in 1998. The JPL concluded that, "Our evaluation of occupant and proximity sensing showed them to be key to reducing air-bag-induced injuries." The JPL further concluded that, "Occupant sensors must be developed that can distinguish with high accuracy small, medium, and large adults; children; and infant seats." The JPL forecasted that some advanced technology features, including automatic suppression, would begin to appear in the market by model year 2001 and that by model year 2003 more sophisticated integration of proximity and occupant position sensors would be incorporated into vehicles. The JPL went on to say that, with the more sophisticated integration of these technologies, "...the only serious risk of air-bag-induced injuries would come from the unreliability of the system. System unreliabilities are expected to result in tens to hundreds of unintended deployments per year." The JPL instructed that, "System and component reliability must receive diligent attention to achieve the high (performance) levels required under field conditions."

The GAO's study of advanced air bag technology three years after the JPL study observed that, "...development of occupant sensing technologies is taking longer than anticipated." The GAO reports development of occupant classification sensors, "...have still not reached the level of development that new technology should have reached to be ready by the (advanced air bag rule's) September 2003 deadline – just over 2 years away." The difficulties encountered in developing robust occupant classification sensors have resulted in two significant manufacturers – Siemens and Bosch – deciding to leave the market. One motor vehicle manufacturer has invested in and prepared at least three separate occupant classification programs that were scheduled to be introduced into production before December 2000. None of the programs made it into production due to various system failures with the developing technologies.

The problem that GAO correctly identified is that prototype occupant classification systems[5] currently available for installation in September 2003 are not able to consistently and reliably distinguish between a Subpart N dummy (currently intended to be representative of a child and small sub teens) and a Subpart O dummy (intended to be representative of small female adult occupants and larger children ages 13 and above). In the real world, this means that prototype sensor technology may signal the air bag to deploy when it should have been suppressed, or may signal it to deploy at full power when it should have deployed at low power, depending upon the compliance strategy selected by the manufacturer. Likewise, prototype sensor technology may erroneously register that a child is present, and signal the air bag to suppress or deploy at low power, when it should have deployed at full power for an adult in a higher speed collision.

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[4] See "Advanced Air Bag Technology Assessment," National Aeronautics and Space Administration, Jet Propulsion Laboratory, California Institute of Technology, April 1998.

[5] Throughout this petition, we use the phrase "prototype occupant classification systems"; "prototype sensor technology"; "prototype occupant classification technology"; or derivations thereof, to identify occupant classification sensors or systems currently under development that are intended to be incorporated into vehicles introduced on or after September 1, 2003 which are certified as being in compliance with all the requirements of the advanced air bag rule published at 65 Fed. Reg. 30680 (May 12, 2000).

The fact that the development of prototype occupant classification technologies has not advanced as rapidly as expected has presented several serious challenges to the motor vehicle manufacturers:

- Manufacturers choosing suppression as the means to further reduce the risk to children are faced with the probability that, in the real world, the air bag will not deploy in some instances when it is potentially beneficial for a small adult, or will deploy in some instances when it is not wanted because a child is present.

- Manufacturers choosing low risk deployment as the means to further reduce the risk to children are faced with the probability that, in the real world, the air bag will deploy in some instances at full power when lower power was appropriate, and vice versa.

- Manufacturers that had depended upon suppliers or technologies that have left the market or failed to materialize are faced with serious problems in developing advanced air bags for sufficient numbers of vehicles to meet the percentage targets set for the first year of the phase-in.

Manufacturers choosing suppression as the means to further reduce the risk to children are also attempting to make it more likely that the advanced air bag will deploy when it is needed for a small adult. However, manufacturers cannot minimize this risk and simultaneously assure compliance with the current test requirements applicable to the Subpart N dummy. Conversely, the manufacturers can optimize the advanced air bag system to make it more likely that the air bag will not deploy when a child is present. However, manufacturers cannot do that and assure compliance with the current test requirements applicable to the Subpart O dummy.

The first requested rule change in this petition is to seek a temporary change to the test requirements applicable to the Subpart N dummy in S23 of FMVSS No. 208, in order to permit optimization of the advanced air bag system to make it more likely that the air bag will deploy when it is needed for small adults in the real world.

The Alliance estimates that it is at least 15 times more likely that an adult or teenager will be sitting in front of a passenger-side air bag, when those seating positions are occupied, during a frontal crash than a sub teen (children between 5 and 12 years old). This fact in combination with the current development status of prototype occupant classification technology, leads the Alliance to believe that the prudent public policy choice is to suspend temporarily the test requirements applicable to the Subpart N dummy, because of the compromise in safety that is apparent relative to small adults in the real world under those requirements. Additionally, while reducing the risk for adults, the prototype occupant classification sensors will still reasonably ensure appropriate deactivation of airbags for infants, small children and a substantial portion of sub-teens. Moreover, continuing to urge properly restraining them in the rear seat can further reduce the risk to children. The Alliance anticipates that improvements in occupant classification sensor technology are likely to permit the test requirements applicable to the Subpart N dummy to be met by MY 2007.

For manufacturers choosing low-risk deployment as the means of minimizing risk to children, the change requested to improve the likelihood of an appropriate air bag response is the substitution of a Subpart O dummy for the Subpart E dummy now called for in the low risk deployment indicant test conducted at 16 miles per hour as specified in S22.5 of FMVSS No. 208. It is the Alliance's understanding that this change was requested in a recent letter from BMW suggesting that the issue could be handled in the forthcoming rule responding to petitions for reconsideration of the May 12, 2000 final rule. The Alliance endorses this request for change, and urges the agency to grant it in the forthcoming response to the reconsideration petitions. In the event, however, that the agency does not plan to implement the amendment to S22.5 suggested by BMW in the forthcoming rule responding to petitions for reconsideration, the Alliance requests the agency to do so in response to this petition.

Some manufacturers are considering relying on a combination of low-risk deployment and suppression as redundant approaches to improve the likelihood of an appropriate air bag response when children are present. However, the current requirement that injury data be collected for 300 milliseconds (ms) after air bag deployment in low risk deployment tests is a deterrent to that strategy. Collecting data for 300 ms after air bag deployment raises the serious possibility that the dummy measurements will include some data resulting from dummy interaction with other interior components, which the agency has traditionally discounted. The agency has previously concluded that, "...the air bag is neither responsible for these injury values nor could the air bag have prevented these interactions with the vehicle compartment." Final Rule, 65 Fed.Reg. at 30728 (May 12, 2000). The Alliance agrees with the agency's conclusion, and would like to ensure that these irrelevant measurements are not included in the dummy measurements. To remove this regulatory impediment to the selection of the low-risk deployment alternative, the Alliance requests the agency to set the data collection period for the low-risk deployment test to 10 milliseconds after dummy interaction with the air bag ceases.

An additional challenge is presented by the inability of prototype occupant classification sensors to detect and classify right front occupants consistently and properly when a center occupant is present on a three-position front bench seat. The most serious risk is that the sensor will misunderstand the weight distribution of the two passengers and erroneously conclude that one adult is present instead of two children. Under these circumstances, the sensor will direct the air bag system to deploy when it should have been suppressed. As there is no other provision of FMVSS No. 208 that can be changed to address this challenge, the Alliance petitions for the allowance of a three-way manual override switch in vehicles equipped with three designated seating positions in the front seat. Such a switch would allow the driver to override the occupant classification decision by manually setting the switch to "ON," in which case the air bag will deploy, regardless of the signals sent by the occupant classification sensor, or "OFF," in which case the air bag will not deploy, or "AUTO," in which case the occupant classification sensor will decide whether the air bag should deploy or not.

Given the potentially serious risk to the safety of children that apparently cannot be further reduced by prototype sensor technology when three persons are occupying front seating positions in certain vehicles, the Alliance submits that the allowance of a three-way manual override switch under the very limited conditions covered by this petition (vehicles equipped with three designated seating positions in the front seat) is necessary to ensure that these advanced air bag systems will appropriately reduce the risk of injury to children.

Finally, the Alliance petitions NHTSA to revise the first year's phase-in requirement from 35 percent to 10 percent of a manufacturer's production. This change is necessitated by the unanticipated technical challenges of making occupant sensing technology work properly in reasonably foreseeable real world conditions, and by the departure from the market of some major suppliers. Notwithstanding substantial good-faith efforts to meet and exceed the 35 percent target in the first year, it is now clear that the technical challenges with prototype occupant sensing technology have required some Alliance members to shift compliance strategies. This has often required them to start over in testing and qualifying advanced air bag systems with much less lead time to address and solve issues as they arise. In these cases, which will be described in separate submissions by the affected Alliance members, the companies simply cannot validate systems in enough vehicles to comply with the 35 percent goal.

CONCLUSION

In the May 12, 2000 final rule establishing the advanced air bag requirements, NHTSA observed:

> "First, particularly given the risks that the first generation of air bags posed to out-of-position children and small adult females, and the reaction of the public to those risks, it is very important that advanced air bags be properly designed from the very beginning. We note that air bags, by their nature, present a potential for safety trade-offs not presented by other safety features. Because of this potential for death and injury, we want to be cautious in how far and how fast vehicle manufacturers are required to advance the state of advanced air bag technologies in their vehicles." Final Rule, 65 Fed.Reg. at 30687 (May 12, 2000).

The Alliance believes that the agency was correct to express this caution. These same cautions should guide the agency to grant this petition for limited amendments to FMVSS No. 208 to allow time for the development of improved occupant sensing technology and to reduce the chances that advanced air bag systems will cause unintended harms.

In summary, the Alliance believes that the advanced air bag rule should be amended as follows:

- implementation of the static out-of-position test requirements at S23 using a Subpart N dummy should be temporarily deferred for 3 years;
- the 300 millisecond data acquisition requirement should be reviewed and adjusted (to 10 milliseconds after dummy interaction with the air bag ceases) to facilitate the adoption of low risk deployment air bags as either a compliance option or as a redundant protection system for suppression systems;
- a limited allowance for a manual 3-way override switch (on – off – automatic) should be provided for 3-position front seating systems; and
- the compliance percentage specified at S14 for the first year of the phase-in should be revised to 10 percent from 35 percent.

In addition, if the agency does not address BMW's request for a revision of S22.5 of the standard to substitute the Subpart O dummy for the Subpart E dummy in the low-risk deployment indicant test (conducted at a test speed of 16 miles per hour) in the forthcoming response to petitions for reconsideration of the May 2000 final rule, then the Alliance petitions the agency to address this issue as part of its response to this rulemaking petition.

Additional rationale and justification for the amendments recommended above are provided in the attachment to this petition.

The amendments sought are the minimum necessary and as narrow in scope as possible to address the problems presented by these technological challenges. Given the complexity of the advanced air bag rule and the flexibility provided by the various compliance options in the final rule, individual Alliance members may also petition the agency for other amendments or interpretations consistent with their respective compliance plans and actions.

The Alliance urges the agency to promulgate individual amendments to the advanced air bag rule as quickly as they can be completed, rather than waiting to promulgate a single package responding to all of the requests contained in this petition or other petitions that may be received. In any case, however, given the September 1, 2003 implementation deadline is fast approaching, the agency is requested to act quickly on this petition. A response to this petition either granting or denying it is requested no later than November 16, 2001. For vehicle manufacturers to meet the September 2003 deadline, commitments to a particular sensor design must typically be made 18 months prior to the start of mass production. During "design commitment" or "design freeze," final testing, validation and certification occurs leading to final engineering and quality sign-off. Following this, commitments for tooling and production facilities are made. At this stage no further changes in design can occur without major disruption of production schedules. For Alliance members, "design freeze" to support a September 2003 deadline has already occurred or will soon occur. Consequently, action on this petition by the agency is needed as soon as possible to preserve the rule's September 1, 2003 implementation. Alliance members are committed to work closely with the agency to accomplish this objective.

Sincerely,
Alliance of Automobile Manufacturers

Robert Strassburger
Vice President
Vehicle Safety and Harmonization

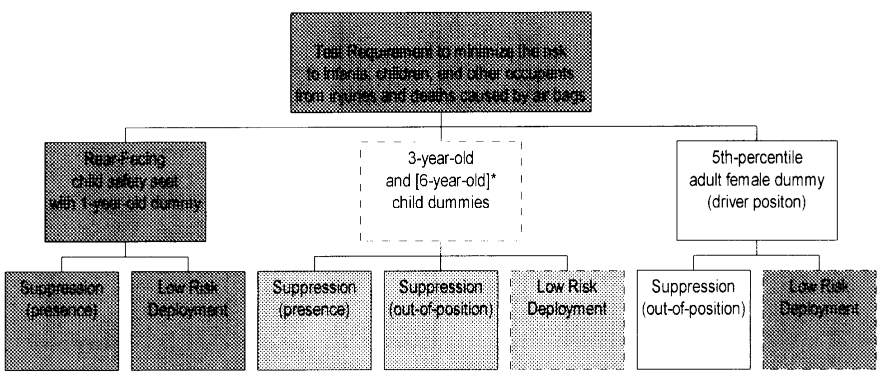
ALLIANCE OF AUTOMOBILE MANUFACTURERS
Supporting Rationale
for
PETITION FOR RULEMAKING
FMVSS No. 208, "Occupant Crash Protection"
October 16, 2001

INTRODUCTION

Individual Alliance members met with the agency to discuss the status of their developments in meeting the new FMVSS 208. These meetings took place over the past 4 months and we believe NHTSA recognizes that certain common themes are emerging that must be addressed through changes to the current FMVSS 208 Advanced Air Bag Technology requirements. The Alliance's petition for rulemaking identifies concerns and suggests specific rulemaking to alleviate these concerns without reducing the effectiveness of the new rule. This document provides additional information and rationale supporting the rulemaking actions recommended in the Alliance petition.

REQUIREMENTS USING SUBPART N DUMMY

The Alliance is petitioning for a three-year delay in the phase-in start date for the Subpart N dummy test requirements (Section S23) as outlined in the Advanced Air Bag Final Rule. The proposed new start date for the phase-in of S23 requirements is September 1, 2006 as shown in Figure 1. This action is necessary due to limitations in state-of-the-art technology appropriate for all three options provided in the standard that are applicable to the Subpart N device.



*Proposed Phase-In Start: September 1, 2006 (6-year-old dummy requirements (S23))

Figure 1

Crash Sensing and Occupant Classification Systems

Crash severity principally determines the deployment power for the low stage of state-of-the-art air bags with dual stage inflation. Due to the uncertainty (gray zone) inherent in crash severity sensing, inflation for the low stage must be sufficient to provide appropriate restraint for unbelted occupants up to the highest crash severity for which only low level inflation could occur. This level of inflation cannot reliably provide low risk deployment for a Subpart N dummy.

Recognizing that when using today's state-of-the-art technology, it is not always possible to design air bag systems that can safely deploy for the broad range of vehicle occupants. The agency gave manufacturers the option to suppress air bag deployment when the benefits of deployment are outweighed by the risks.

Vehicle manufacturers have been working with suppliers for many years to attempt to develop air bag suppression systems that can accurately classify occupants and activate or deactivate an air bag system consistent with a reasonable balance of benefits and risks. However, state-of-the-art air bag suppression systems that will be available during the current phase in period cannot accurately and reliably classify all occupants and contain "gray zones". The concern for accuracy and reliability not only relates to the ability to meet certification requirements but also to real world durability over the life of the vehicle. As a result, manufacturers are forced to evaluate the population of occupants in the front passenger seat and decide how to balance the activation or deactivation of the air bag system so that a reasonable level of safety can be achieved. This decision is negatively affected by the testing requirements of the regulation.

Conflicting Requirements

Currently available state-of-the-art automatic air bag suppression technologies discriminate based upon occupant seated mass (GAO Report, June 2001). Technical data recently provided to the agency by Alliance member companies have demonstrated that the region of uncertainty or "gray zone" of automatic air bag suppression technologies for classifying real world occupants has a span that includes estimated weight ranges from the 6-year-old child U.S. population to the small adult U.S. population[1]. The real world implications of the gray zone, and the estimated ranges of weights of 6-year olds and small adults within the gray zone, are shown in Figure 2.

[1] National Health and Nutrition Examination Survey III, U.S. Dept. Health and Human Services, Centers for Disease Control, 1988 – 1994. CDC Growth Charts for 2000 appended to this document.

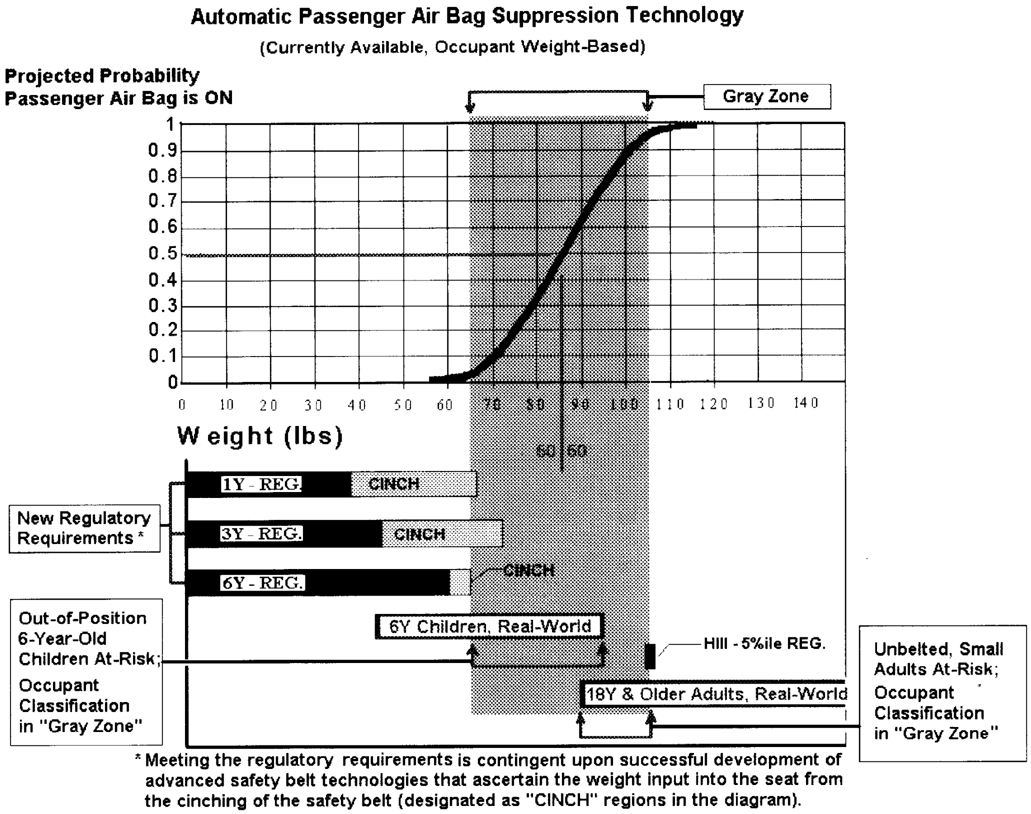


Figure 2

For example, a 6-year-old child whose weight is in the gray zone may be classified as a small adult resulting in air bag activation during a frontal crash. A small adult whose weight is in the gray zone may be classified as a 6-year-old child resulting in air bag suppression during a frontal crash. Absent the requirements of S23, manufacturers can adjust the gray zone up or down the weight axis consistent with real world safety needs. Alliance member companies have previously submitted data, and plan to submit additional data, to the agency demonstrating that the present regulatory requirement eliminates this flexibility and dictates how manufacturers must balance the real world consequences for these two classes of occupants. Moreover, vehicle manufacturers do not believe that the present regulatory requirements properly balance real world safety because they will reduce the potential benefit from air bags for some unbelted occupants.

Figure 2 illustrates the limitations of a weight-based occupant classification system if it could operate with no sensing uncertainty due normal installation and seating variability (as well no consideration of variable materials and manufacturing). Figure 3 shows a more real-world condition, illustrating the limitations of currently available weight-based air bag suppression technology. This data is based on a current state-of-the-art seat cushion load sensing system which requires a seat belt tension sensor to correct for the effects of a cinched child seat. The frequency distributions illustrated show the likelihood of observing a value of weight (cushion load corrected for seat belt tension) for a variety of different occupant sizes. This data represents laboratory tests on a test bench that does not reflect all of the variability present in actual vehicles. The distribution of 6 year old and 5th percentile ATDs define two of the compliance test conditions. These two classes of occupants appear to be separable in these idealized test conditions. These two classes could be used to establish the sensor performance gray zone. However, other occupant classes are not able to be separated as effectively. Uncertainty in belt tension sensing results in a wide distribution of the cushion loads for rear facing infant seats (RFIS) with a one year old ATD and forward facing child seats (FFCS) with a 3 year old ATD. A significant fraction of this class of occupant will fall into the gray zone. A more serious problem results with actual 5th percentile female human subjects. In this case, a large fraction of this class of occupants will fall into the gray zone. The best estimates of the distribution of 6 year old children suggest that a large fraction of this class occupants will be potentially misclassified.

It should be noted that Figure 3 represents data collected in a laboratory environment. The effects of variability attributed to vehicle build, material composition, environment and aging factors is not considered. These sources of variation will further complicate the problem of separating the classes of occupants that require air bag suppression from those where the air bag should be enabled.

Currently Available Weight-Based Air Bag Suppression Technology
(Seat Cushion Load Corrected for Seat Belt Tension)

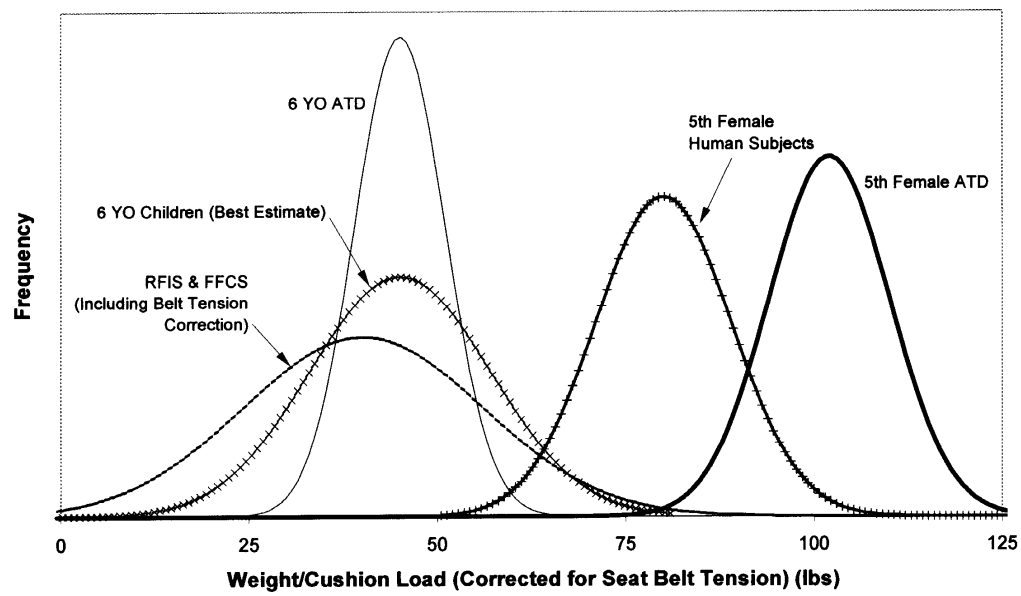


FIGURE 3

Real World Safety Benefits Result from a Temporary Deferral of the S23 Test Requirements

A temporary deferral of the phase-in timing for the S23 test requirements would enhance real world safety and provide an opportunity to further advance air bag low risk deployment and/or suppression technologies as follows:

- Additional time would be available to develop and improve viable low risk deployment and/or automatic air bag suppression technologies for the entire range of vehicle configurations in the U.S. fleet.

- Automatic Passenger Air Bag Suppression Sensing Algorithms could be adjusted so that unbelted small adult right front passengers would be appropriately classified and thereby continue to receive the benefits of air bags in real world, frontal collisions.

- Automatic Passenger Air Bag Suppression systems would suppress deployment in the real world for the most vulnerable occupants, infants and small children.

- Other technological improvements in air bags such as variable rate inflation could possibly still provide a friendlier environment for larger children.

TEST DUMMY DATA COLLECTION

The agency stated that test dummy data will be collected for 300 milliseconds (ms) after the vehicle strikes the barrier in a dynamic crash and 300 ms after air bag deployment in low risk deployment (LRD) tests. The Alliance feels that the intent of this data collection time period is to provide an objective limit to data collection. However, particularly regarding static testing, a 300 ms time period could include test dummy data resulting from dummy contact to vehicle interior components such as the seat. These measurements may not be indicative of those observed in real world dynamic events. In addition, the dummy kinematics over such a large time interval are highly variable and not reproducible so that data collection over this time period impairs test reliability and comparability. <u>Therefore, the Alliance petitions NHTSA to revise the test dummy measurement time limit to 10 ms after dummy interaction with the air bag ceases.</u>

We note that the agency has traditionally discounted data recorded as a result of dummy contact to vehicle interior components. Further, the agency also states that it, "...[continues] to believe...that the air bag is neither responsible for these injuries nor could the air bag have prevented these interactions with the vehicle compartment." The Alliance agrees with the agency's assessment that the air bag is not responsible for these injuries and that the nature of the tests could produce test dummy measurements, due to the dummy rebounding off interior components of the vehicle, that are not representative of a real world crash event. Further, some of the dummy instrumentation is not designed to be biofidelic in all directions. For example, the Hybrid III dummy head was not designed to be biofidelic for rigid surface impacts to the back of the head form.

In its description of the history behind this injury measurement, the agency alludes to the original SNPRM, in which the agency proposed a 300 ms time period for dynamic tests and a 100 ms time period for LRD tests, since these LRD tests, "... do not involve a complete vehicle crash and are intended only to address the potential adverse effects of an air bag..." This indicates that the event represented by the LRD test does not mimic the complete vehicle crash and can only address potential adverse effects of the air bag.

Finally, the agency notes that it, "[intends] to retain [its] existing policy on considering the location of the dummy relative to the vehicle interior and the air bag at the time peak injury measurements are recorded." The Alliance interprets this to mean that, should dummy interaction with the air bag cease, later peak injury measurements will be discounted.

Therefore, based on the conclusions above that the airbag is not responsible for injuries due to rebound, the agency's intent is to measure injuries only due to potential adverse effects of the air bag, and that dummy position relative to the air bag should be considered when interpreting the injury results, the Alliance feels that the agency does not intend to count injuries measured as a result of dummy interaction with vehicle interior components after the dummy interaction with the airbag ceases. In order to develop an objective procedure that also insures consideration of the aforementioned intent, the Alliance petitions for an amendment to FMVSS 208 to specify that injury data be collected until 10 ms after the dummy stops interacting with the air bag.

3 POSITION OVERRIDE SWITCH

The Alliance is petitioning the agency to provide a limited allowance for a 3-Way Manual Override Switch for certain vehicles equipped with advanced air bags. An example of these limited situations would be vehicles that have three across front seating since certain automatic suppression technologies have difficulty properly classifying the right front occupant size when a center occupant is present.

As described in individual manufacturers' meetings with the agency, FMVSS 208 requirements present a number of challenges for vehicle designers. Though many systems can comply with the requirements in FMVSS 208, manufacturers continue to have concerns with the ability of Occupant Classification Systems (OCS) to correctly characterize some real-world situations. Unfortunately, the current developmental technology has limitations as to its accuracy and reliability in the real world. Further, customers should have the freedom to override the system, should they be uncomfortable with the system determination for airbag deployment or suppression. For this reason the Alliance petitions NHTSA to allow a 3-Way Manual Override Switch for certain vehicles.

There is a practical real-world concern regarding OCS detection of occupants seated on a 3-across seat, such as those used in pick up trucks. First, the seat is divided into 3 sections, typically distributed as 40% for the driver's seat, 20% for the center seat, and 40% for the passenger seat. As seen in Attachment 1, there are many possible ways for the center occupant to sit. First, the occupant could be seated completely on the 20% center section with both feet on the center tunnel. Second, sliding toward the passenger side, the center occupant could sit on the intersection of the 20% center and the 40% passenger seat, with one foot on the passenger floor well and the other on the center tunnel. Finally, sliding as far over as possible, the center occupant could be positioned on the 40% passenger seat, either completely on top of the 40% seat or on as much of the seat as physically possible (given vehicle compartment constraints, CRS, etc.).

With the many variations in position for the center seat occupant, the OCS has difficulty accurately characterizing the occupant of the 40% passenger seat. Testing conducted using development prototypes of 3-across seats (Attachment 1, Figures 1 ~ 9) shows the resulting classification of the passenger occupant by the OCS if the center occupant is a 5th percentile female, 50th percentile male, or 95th percentile male. When examining the measurement data, the following observations are made. First, the commercial load cells used to simulate a weight-based OCS system have difficultly classifying the occupant of the 40% passenger seat if a center occupant is present, regardless of the size of the center occupant. As seen in Figure 1 with a 12 month-old CRABI in a rear facing infant seat (RFIS) passenger, as the center occupant moves to the 20/40 split and further, the OCS detects the weight of the center occupant and classifies the CRABI in a RFIS as a heavier occupant. Therefore, the airbag could be activated with a RFIS in the passenger seat. Figures 2 and 3 show that for a 3 year-old occupant, with and without a forward-facing child seat (FFCS), the trend is the same, whereby if the center occupant moves to the 20/40 split and beyond, the OCS incorrectly classifies the passenger occupant and activates the bag. Finally, the same trend is observed for the 6 year-old occupants with and without a Booster seat (Figures 4 and 5).

When considering a prototype fluid-filled bladder pressure sensing system (cushion load OCS system), similar trends are observed depending on the passenger occupant. For example, Figure 6 shows that for a 3 year-old without a FFCS, the center occupant has the same effect as for a strain gage OCS in that the position of the center occupant can cause an incorrect classification, thereby activating the air bag. However, this trend is not observed if the 3 year-old is restrained in a FFCS. This is a feature of the bladder type OCS in that the footprint of the FFCS is dominant; it prevents the center occupant from moving close enough to the suppression device, therefore, the position of the center occupant has negligible effects on the 40% passenger seat classification (Figure 7). However, there are still real world concerns that the OCS could incorrectly classify the occupant of the 40% passenger seat in a 3 across vehicle seat. It should be noted that this data is based on a laboratory bench test, larger potential overlaps of occupant classes could occur in actual vehicles.

To address these concerns, the Alliance petitions for allowance of a 3-Way Manual Override Switch (Please see Attachment 2). The 3-Way Manual Override Switch ("switch") consists of three operating positions: "ON", "AUTO", and "OFF". The intent of the switch is to provide a redundant system by which the operator could manually override an incorrect decision made by the OCS suppression technology.

The consumer would continuously be informed of the deployment status of the air bag by a telltale indicator, illuminating either "ON" or "OFF" light for the bag. If the consumer chooses the "ON" position, then the air bag will definitely fire, based on crash severity. In this case, the telltale would read "ON" at all times. However, if "OFF" is chosen, then the air bag is completely deactivated and will not fire under any conditions. This causes the telltale to read "OFF" at all times. Finally, if "AUTO" is chosen, then the OCS will be employed to make its decision and the system will deploy, or suppress the bag according to occupant size and crash severity. Accordingly, the telltale would illuminate either "ON" or "OFF" depending on the decision of the OCS. This same telltale indication would serve as the prompt to the operator to override the system (i.e., if a child in a CRS needs suppression or a small adult needs a bag). In any case, the consumer can make an informed decision based on the reading of the telltale and the occupant of the passenger seat.

As explained above, the redundancy provided by the switch alleviates real-world concerns by giving added insurance that the correct decision is made. Given the complex nature of occupant classification, coupled with the substantial overlap in the small female vs. child populations, it is not possible for current occupant classification systems to accurately discern between the two populations and design air bags within the requirements of FMVSS 208. Therefore, the Alliance petitions for an allowance of the 3-Way Manual Override Switch as a necessary redundancy to insure protection of all occupants.

PHASE-IN PERCENTAGE

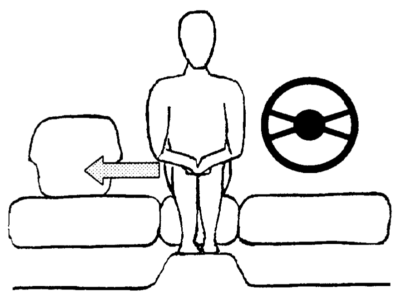
The Alliance is petitioning NHTSA for rulemaking to amend the advanced air bag phase-in percentages of S14, as published in the Federal Register of May 12, 2000. Specifically the Alliance petitions the NHTSA to revise the first year's phase-in requirement from 35% to 10% of a manufacturer's production.

In the course of integrating the various occupant classification technologies into production vehicles, members of the Alliance have, uncovered numerous and significant technical issues, many of which have been discussed with NHTSA during individual meetings. These technical challenges have required some Alliance members to shift compliance strategies, sometimes starting over in testing and development of advanced air bags with much less lead-time to address and solve issues as they arise.

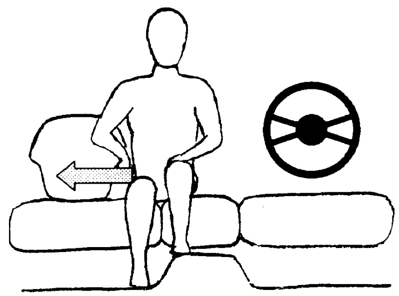
For a number of our member companies, these technological challenges have meant that early introduction of advanced air bag compliant vehicles, and thereby building up of 'carry forward' credits has vanished as an option. For these manufacturers, the vehicle mix has had to be rearranged, making the current initial phase-in level of 35% difficult, if not impossible to achieve, given that the lead time remaining is less than the amount of time needed to validate an advanced air bag for a particular vehicle model. In light of these circumstances, and the continued uncertainties about the maturity of the technology, the Alliance petitions NHTSA to revise the initial advanced air bag phase-in percentage of 35% to 10%, with the rest of the phase-in percentages remaining the same.

The Alliance believes that this adjustment to the first year phase-in percentage is a reasonable response to the unexpected problems that have arisen in the development of the advanced air bag technology, particularly in light of the agency's (and the industry's) good faith assumption that advanced air bag technology would mature more quickly. The Alliance fully concurs with the agency's statement in the preamble to the interim final rule, that the complexity of the task in meeting the Congressional mandate of "getting it right" (65 Fed. Reg. 30689) is indeed paramount. It is not in the best interest of the American public to force advanced air bag technology into vehicles before the vehicle specific validation and tuning has been completed. It is for this reason that we petition NHTSA to adjust the first year phase-in percentage from 35% to 10% of a manufacturers production.

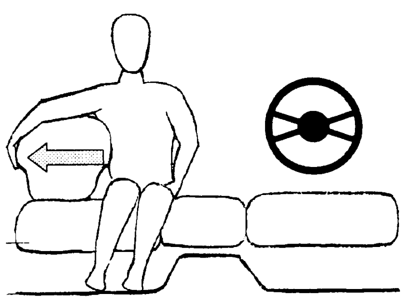
Attachment 1: Three Across (40-20-40 Split Bench) Seating Test Conditions



Centered on 20% Seat
(The center position occupant is seated in on the centerline of the 20% center position. Both feet are on the center tunnel.)



Middle of 20/40 Split
(The center position occupant is seated in on the intersection of the 20% center and 40% passenger positions. One foot is in the passenger floor well and one is on the center tunnel.)



Sharing Passenger Seat
(The center position occupant is sharing the passenger seat as much as vehicle packaging and child seat size will allow. Both feet are in the passenger floor well.)

Figure 1

Three Across Seat Testing (Strain Gage System; 40-20-40 Truck Seat)
12 Month Old ATD with RFIS in Passenger Seat

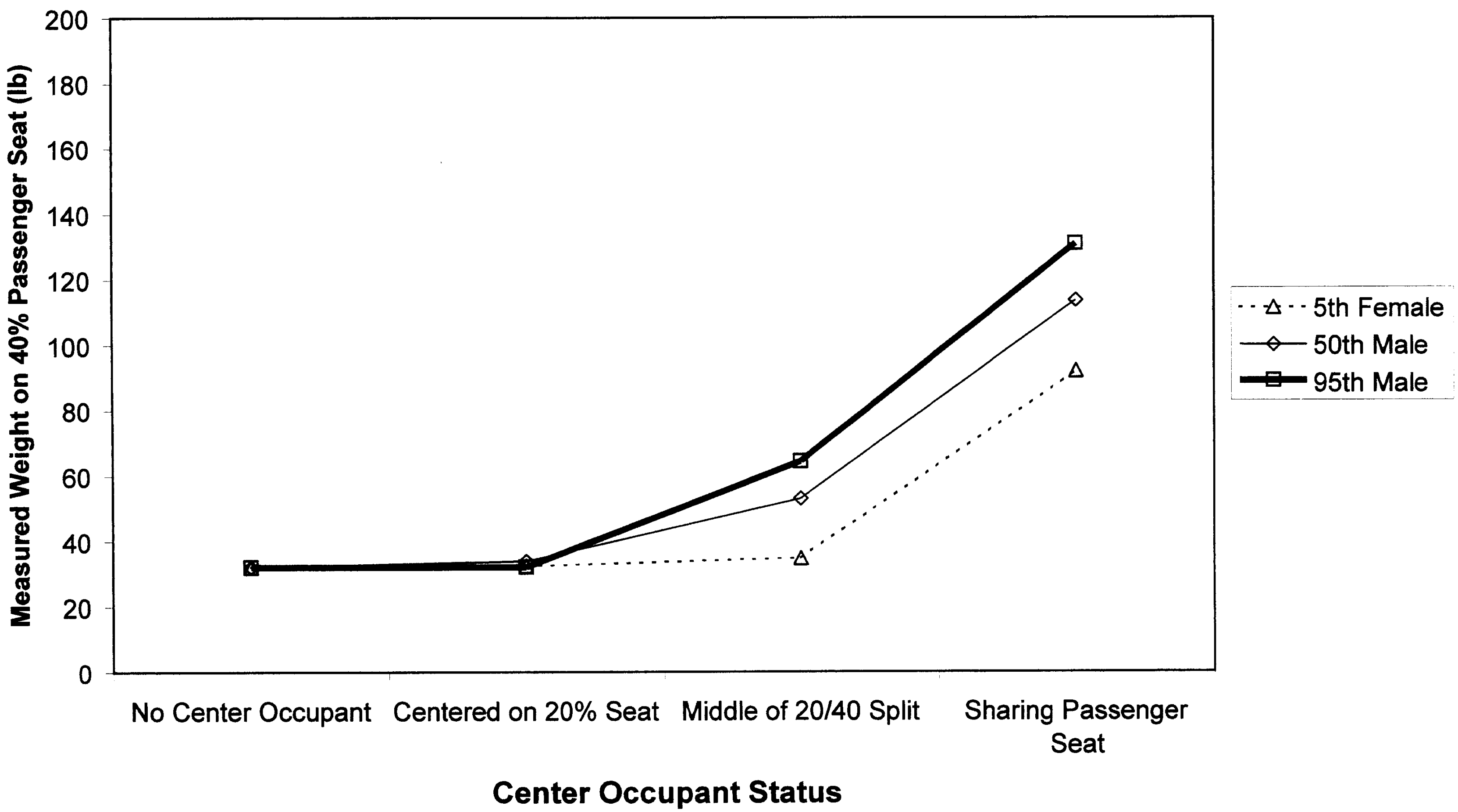


Figure 2

Three Across Seat Testing (Strain Gage System; 40-20-40 Truck Seat)
3 Year Old Hybrid III ATD without FFCS in Passenger Seat

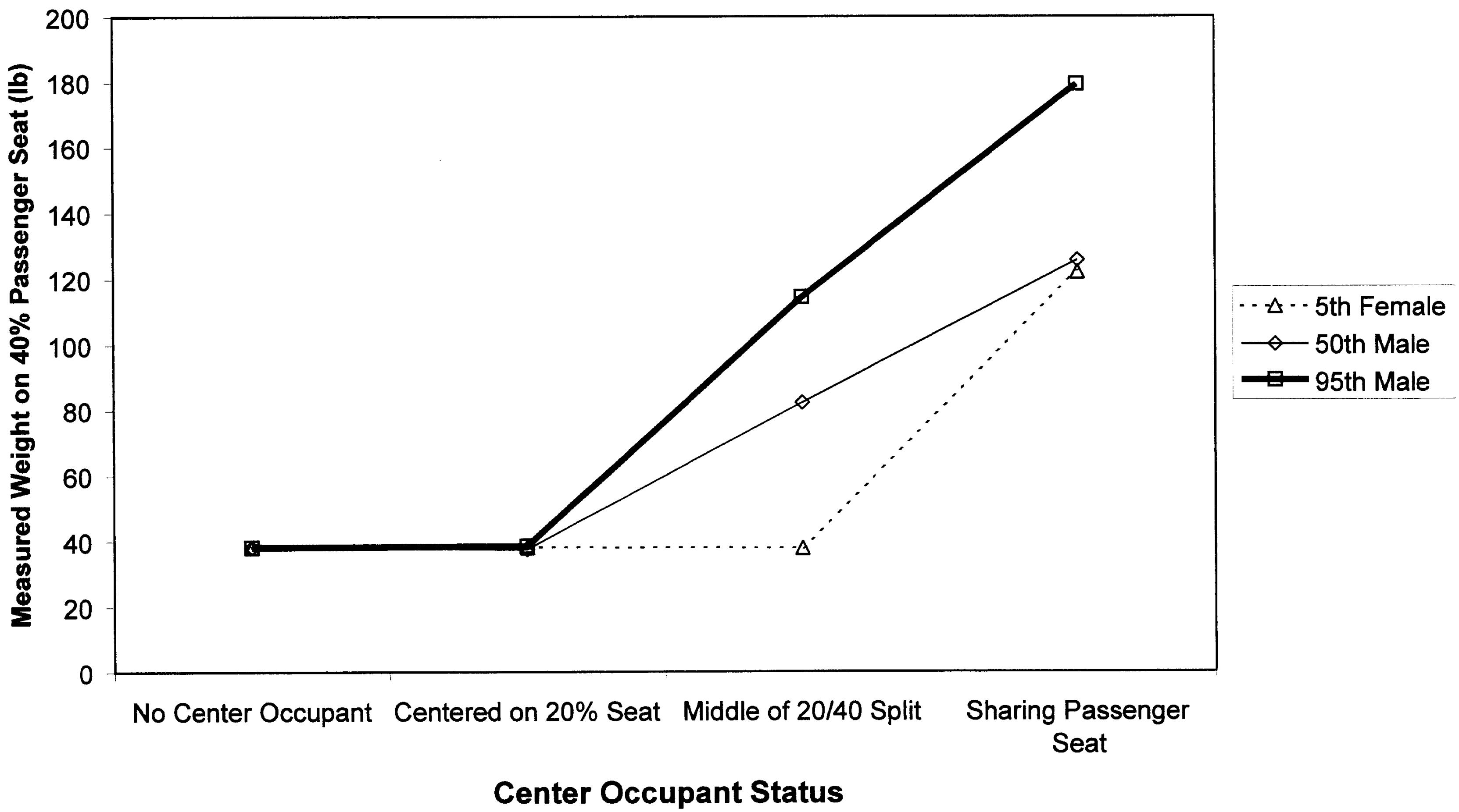


Figure 3

Three Across Seat Testing (Strain Gage System; 40-20-40 Truck Seat)
3 Year Old Hybrid III ATD with FFCS in Passenger Seat

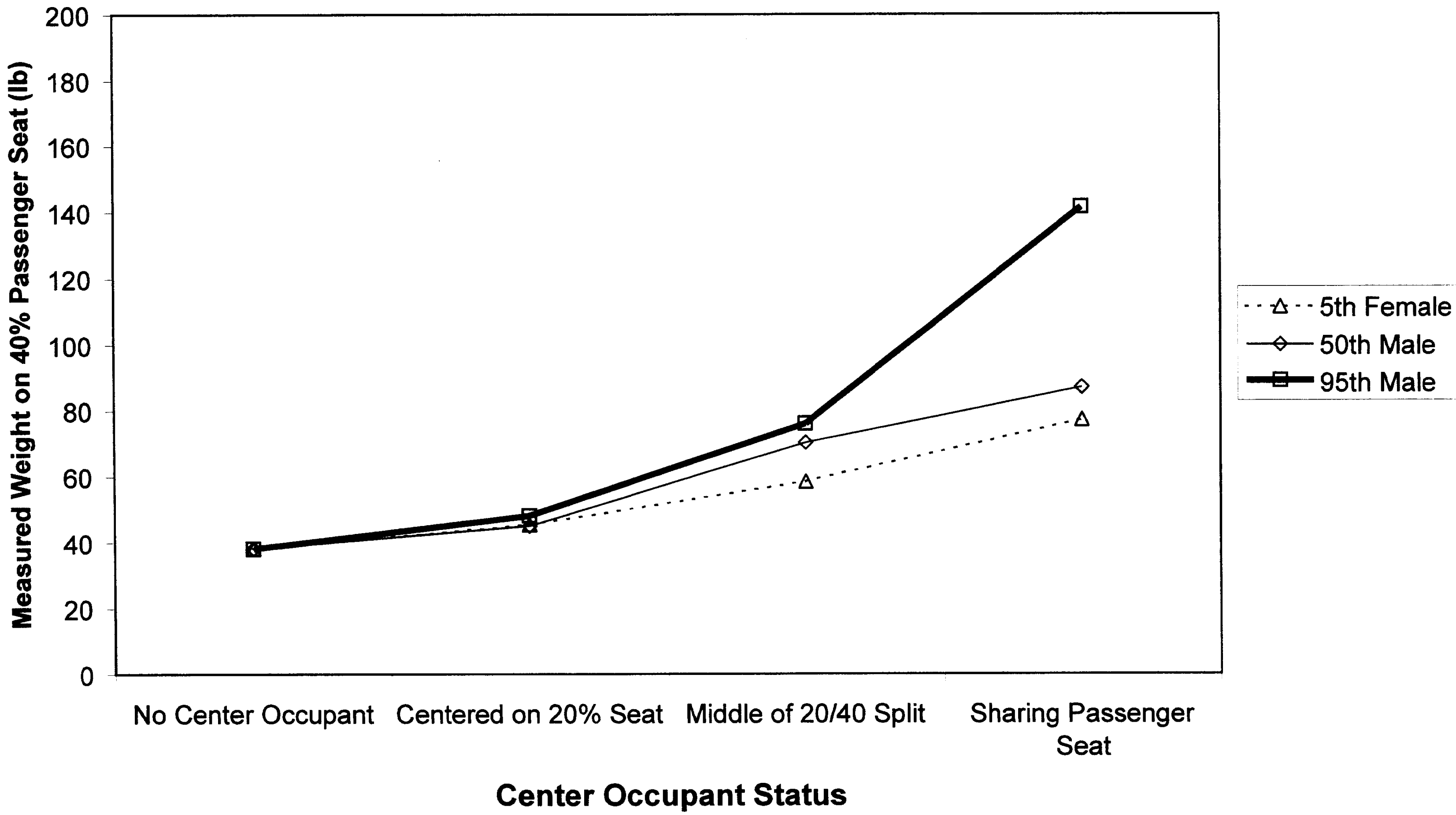


Figure 4

Three Across Seat Testing (Strain Gage System; 40-20-40 Truck Seat)
6 Year Old Hybrid III ATD without Booster Seat in Passenger Seat

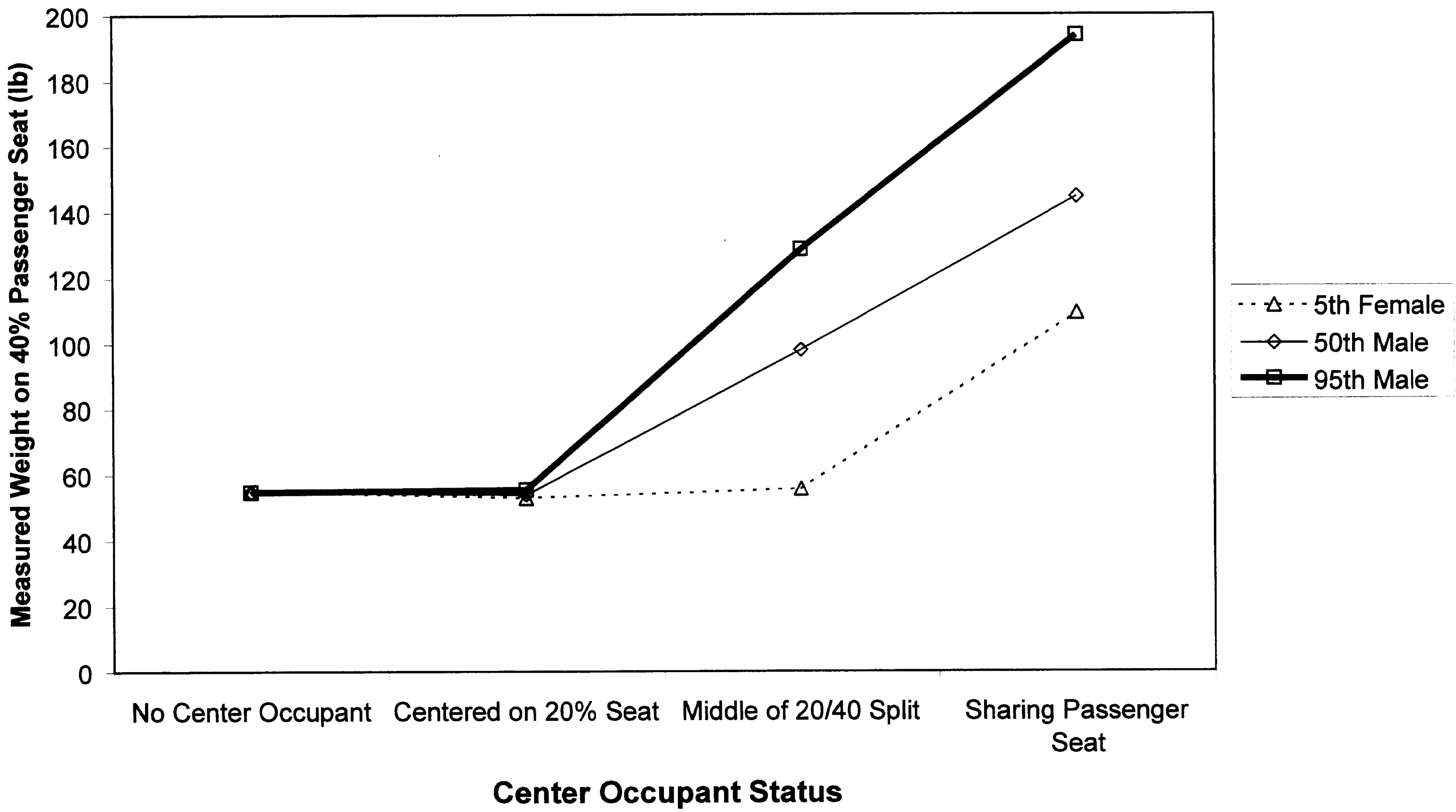


Figure 5

Three Across Seat Testing (Strain Gage System; 40-20-40 Truck Seat)
6 Year Old Hybrid III ATD with Booster Seat in Passenger Seat

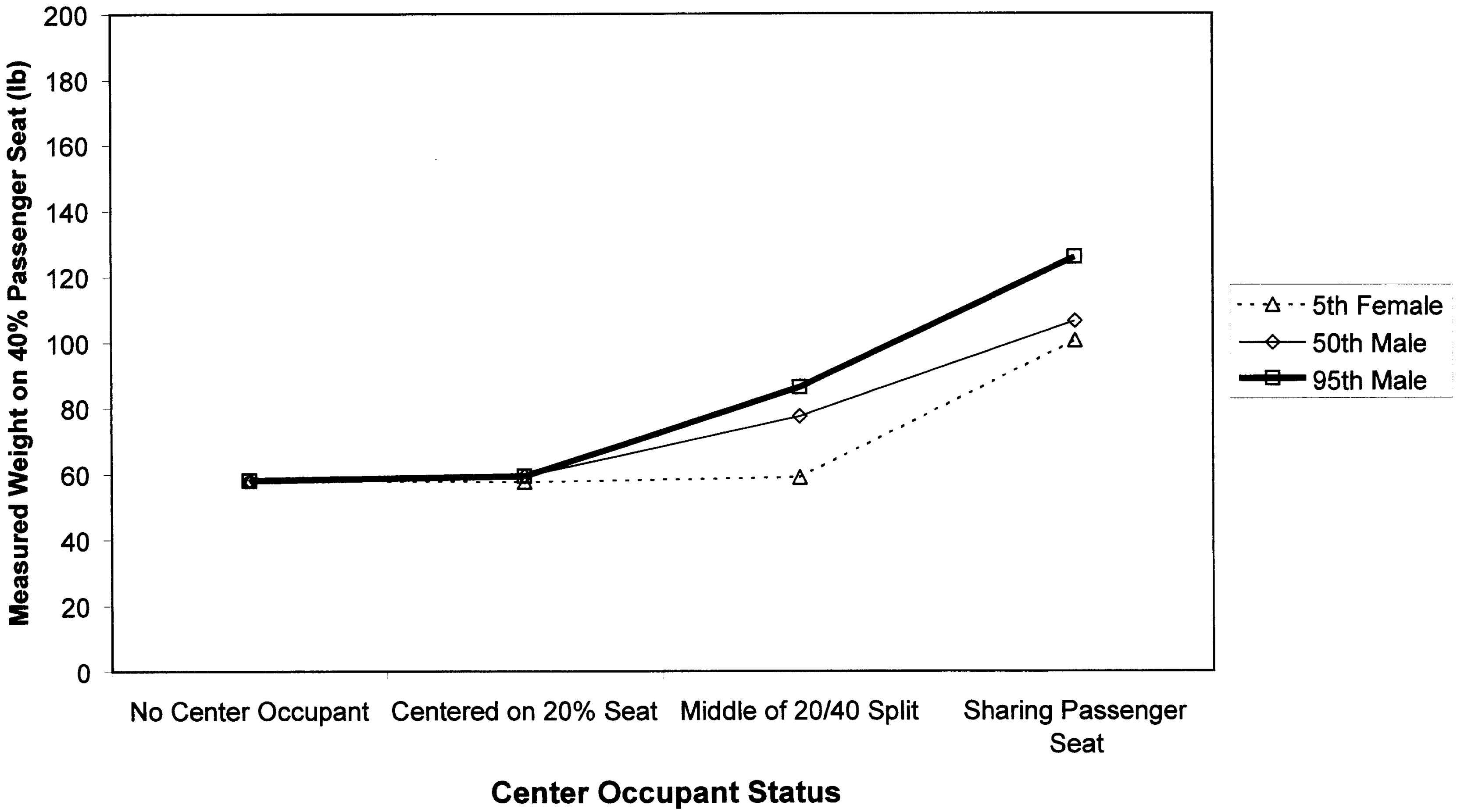


Figure 6

Three Across Seat Testing (Bladder System; 40-20-40 Truck Seat)
3 Year Old Hybrid III ATD without FFCS in Passenger Seat

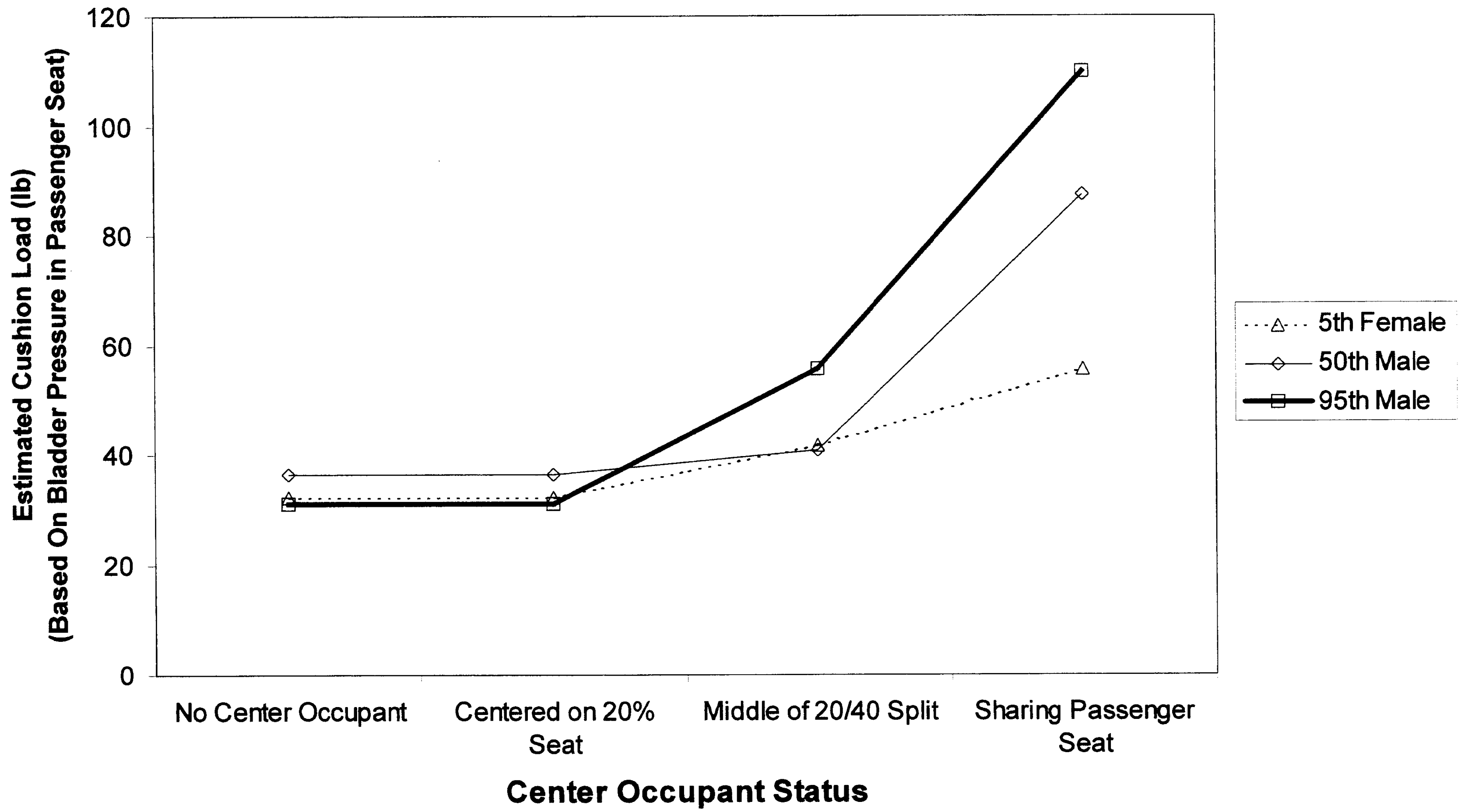


Figure 7

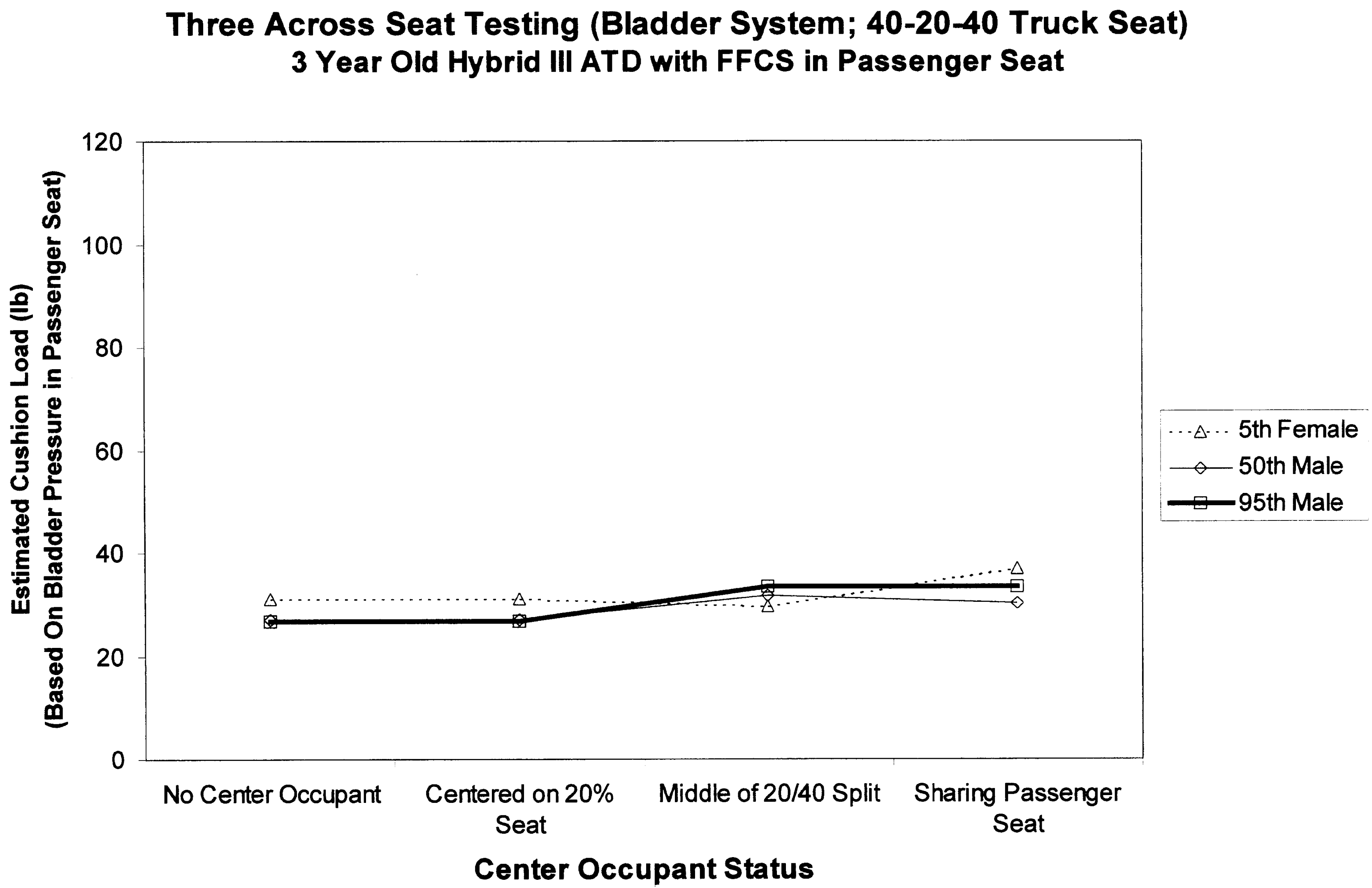

Three Across Seat Testing (Bladder System; 40-20-40 Truck Seat)
3 Year Old Hybrid III ATD with FFCS in Passenger Seat
Estimated Cushion Load (lb)
(Based On Bladder Pressure in Passenger Seat)
0
20
40
60
80
100
120
No Center Occupant
Centered on 20% Seat
Middle of 20/40 Split
Sharing Passenger Seat
Center Occupant Status
5th Female
50th Male
95th Male

Figure 8

Three Across Seat Testing (Bladder System; 40-20-40 Truck Seat)
6 Year Old Hybrid III ATD without Booster Seat in Passenger Seat

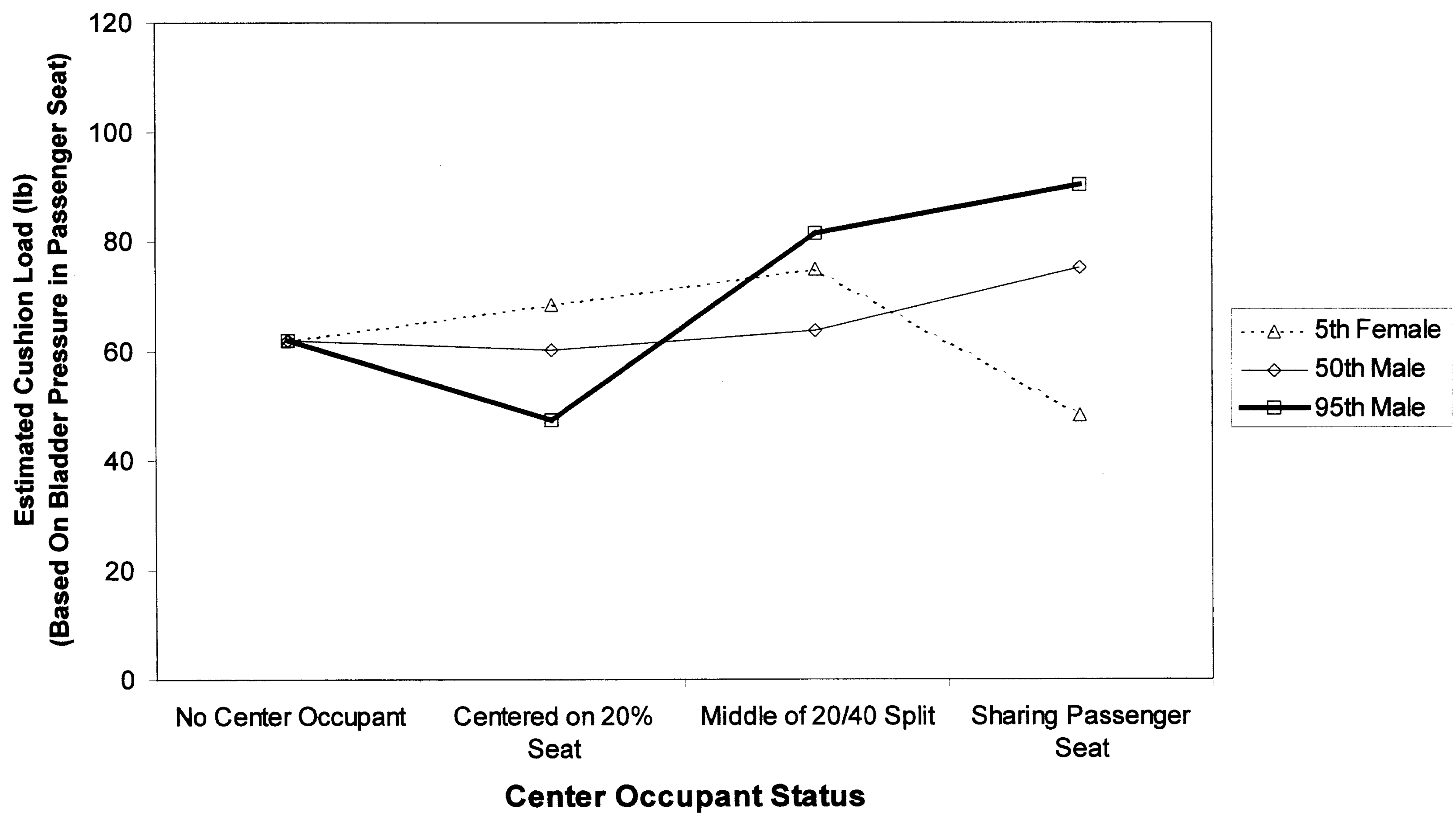
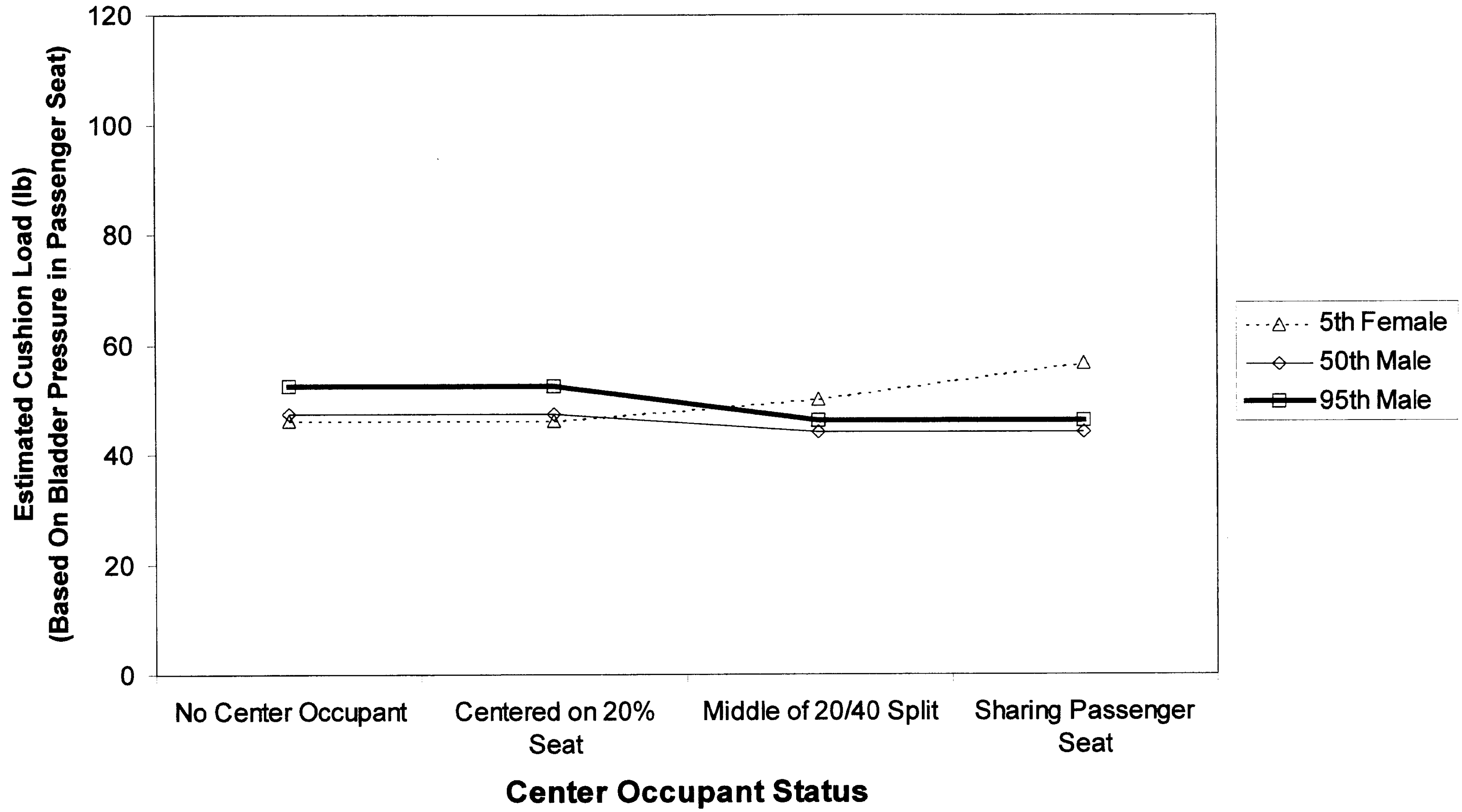


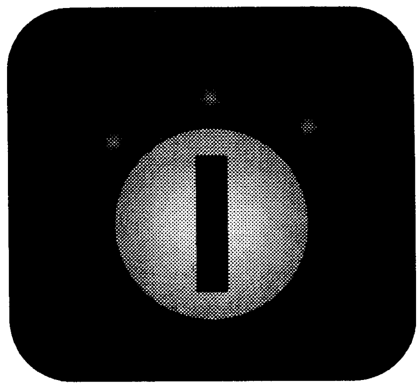
Figure 9

Three Across Seat Testing (Bladder System; 40-20-40 Truck Seat)
6 Year Old Hybrid III ATD with Booster Seat in Passenger Seat



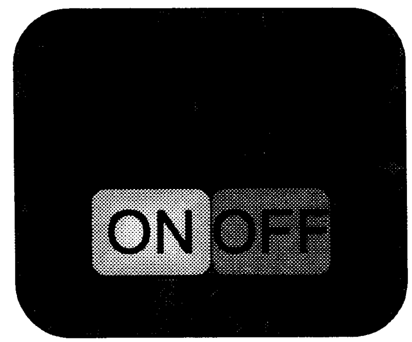
Attachment 2: Manual ON/OFF Switch

Automatic Suppression & Manual ON/OFF Switch



Key Switch

(Located in glove box)

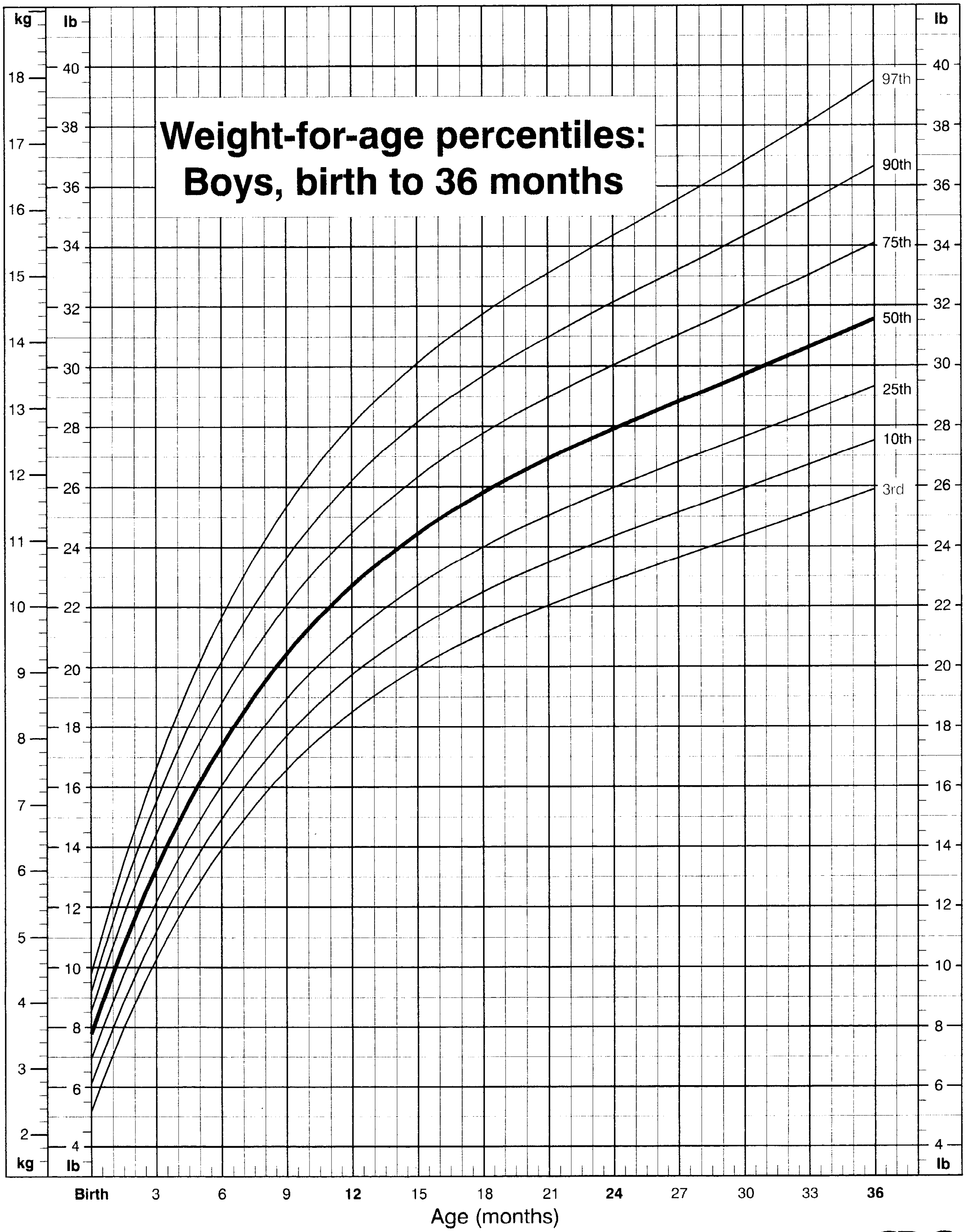


ON/OFF Indicator

(Located on center cluster)

- Allows customer to override incorrect occupant sensing indicated by OCS.

CDC Growth Charts: United States



SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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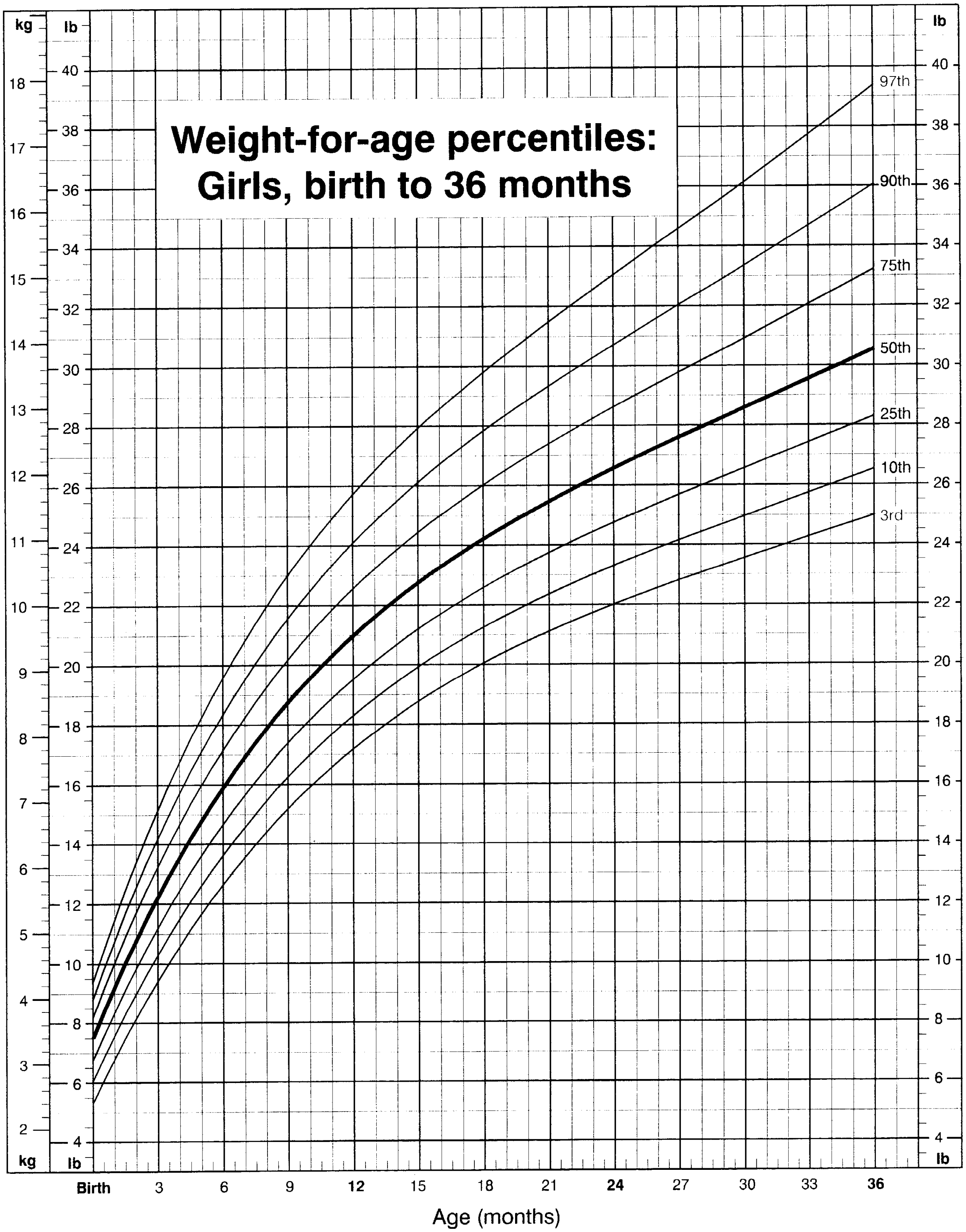
CDC Growth Charts: United States



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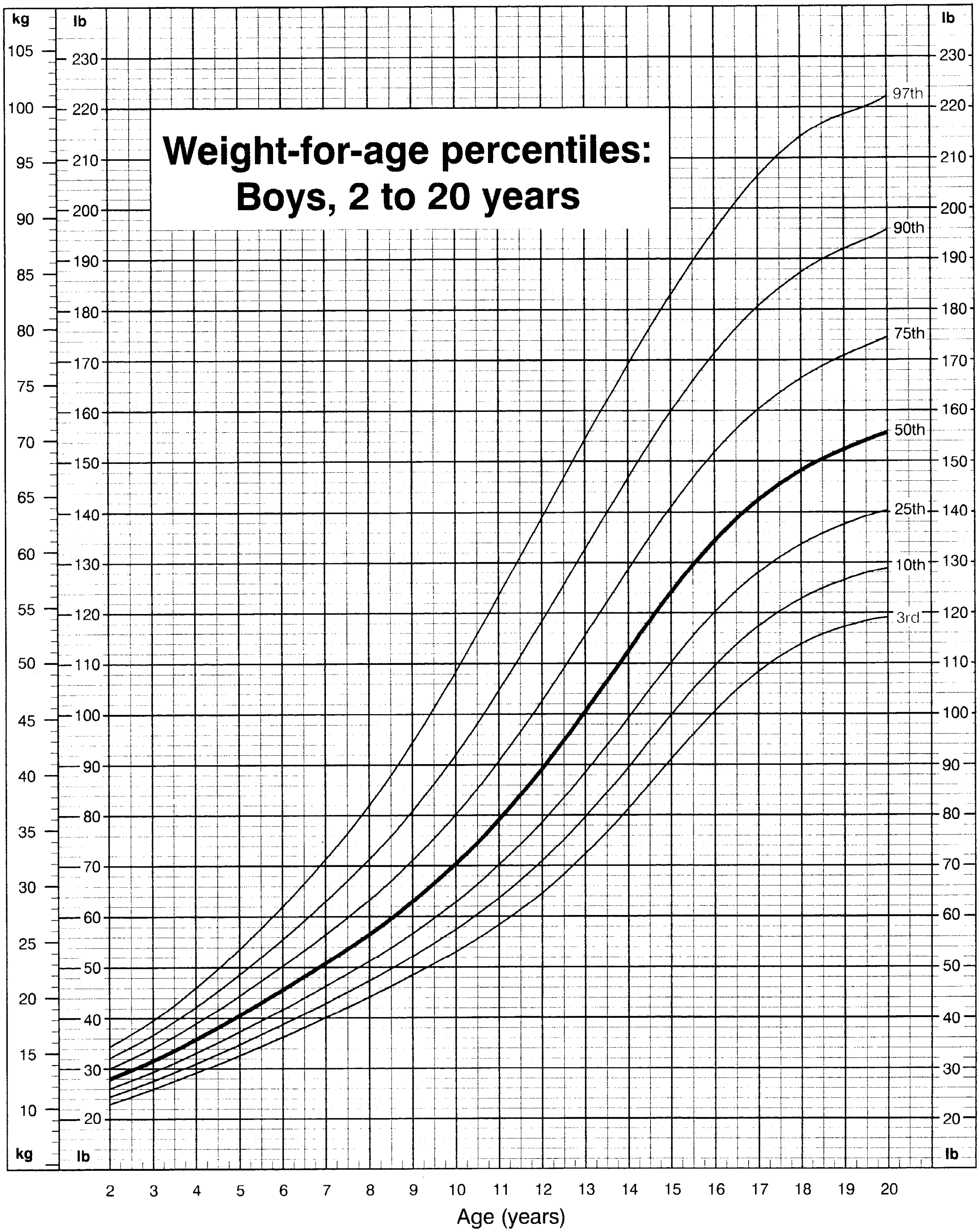
CDC

CDC Growth Charts: United States



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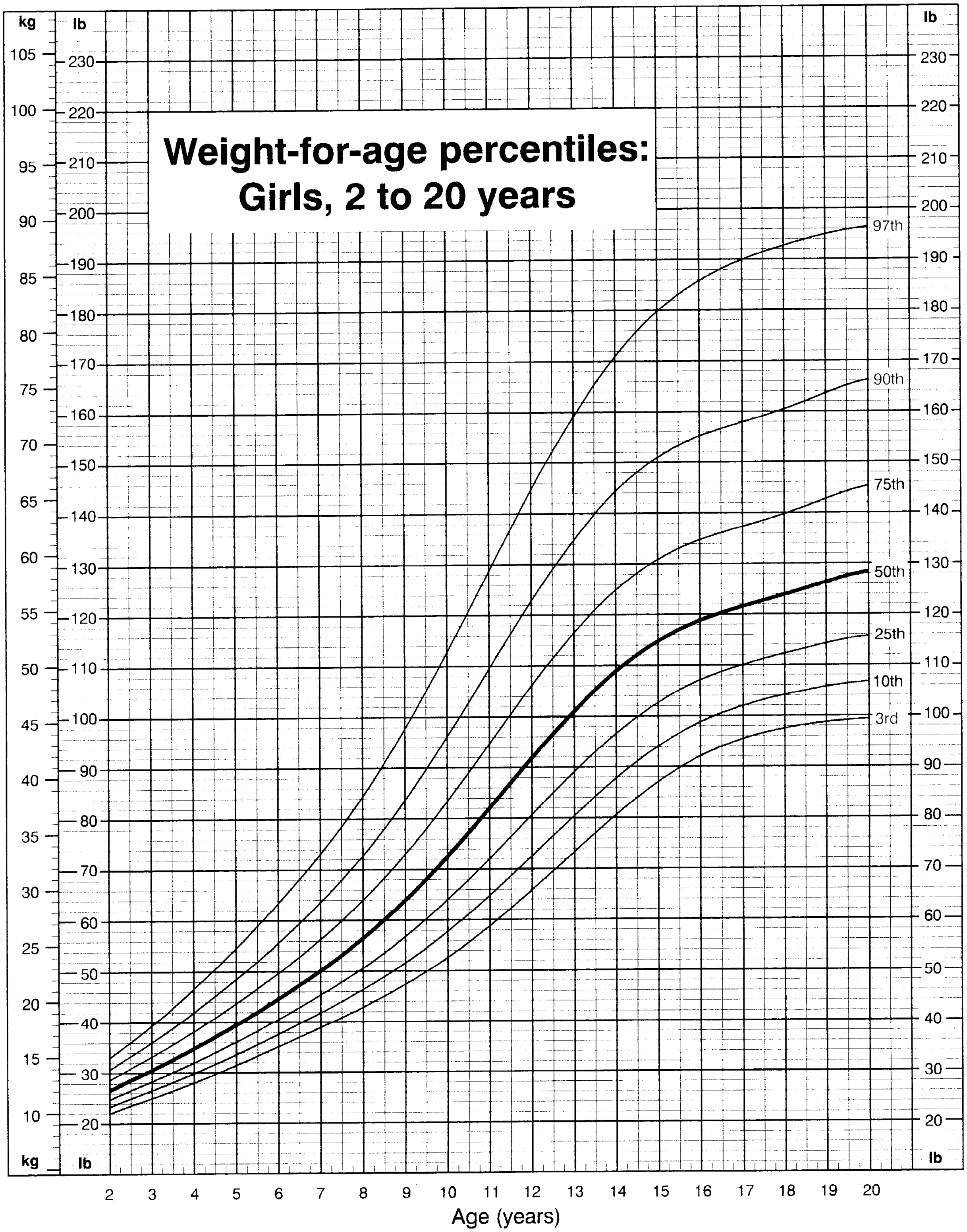

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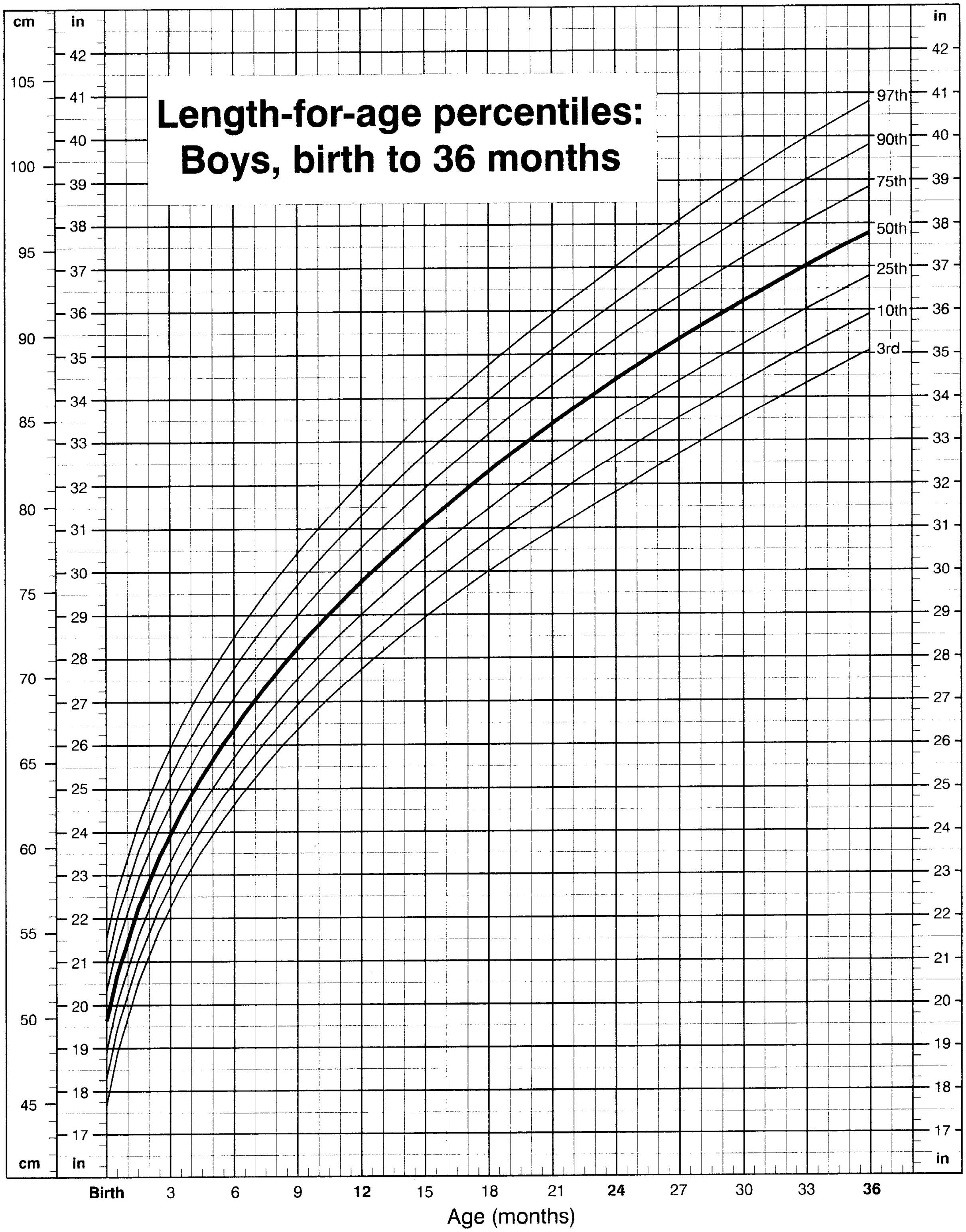

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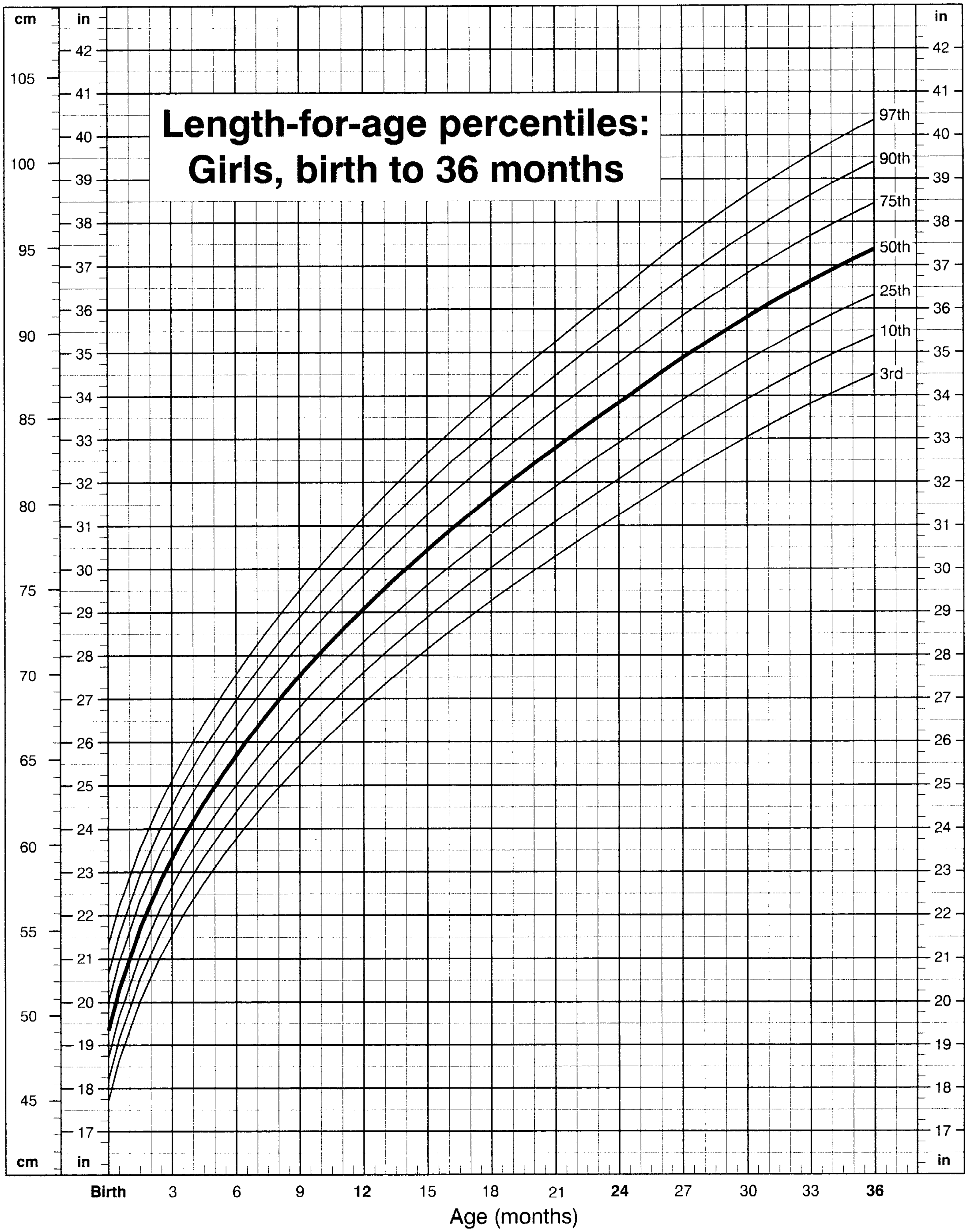

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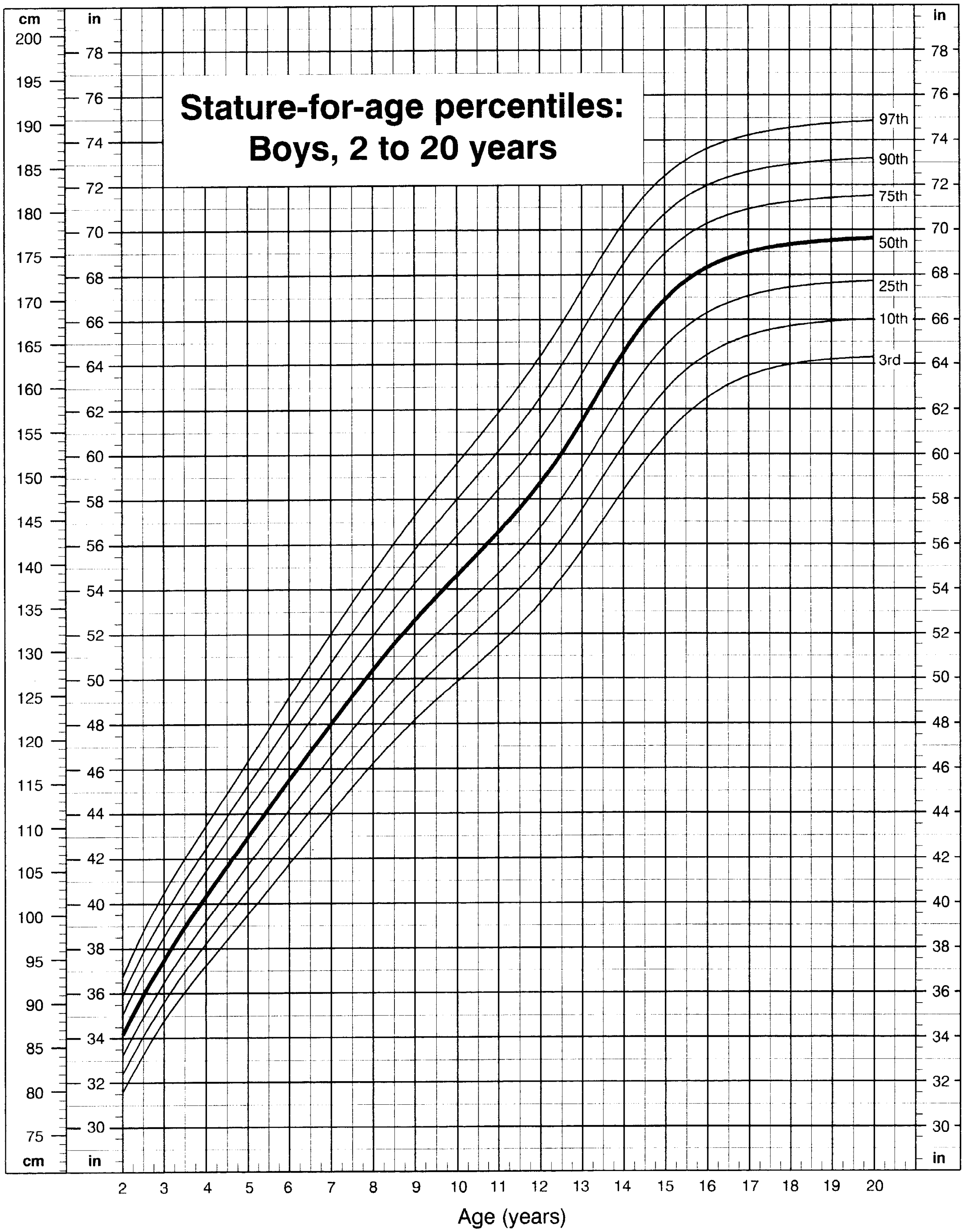

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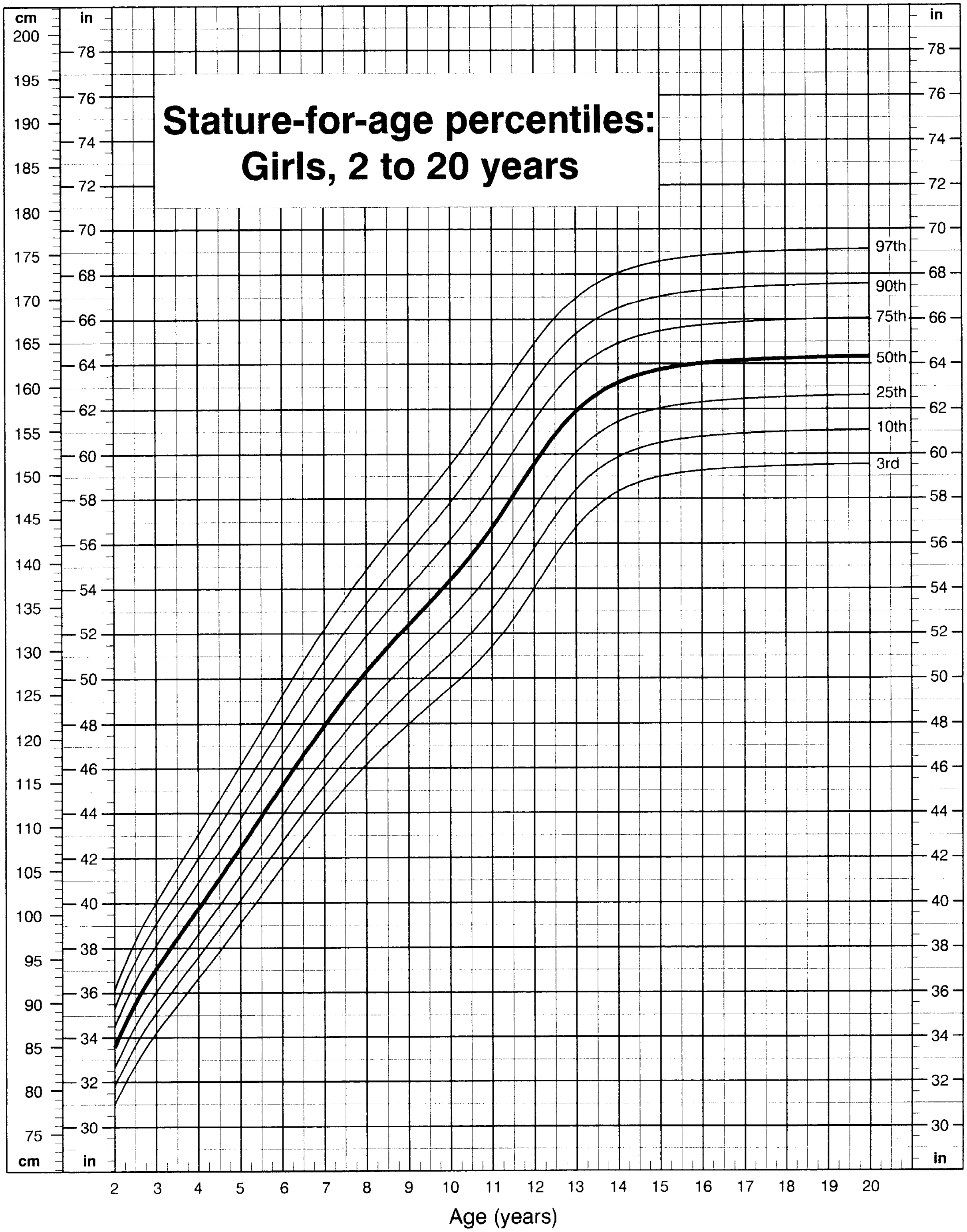

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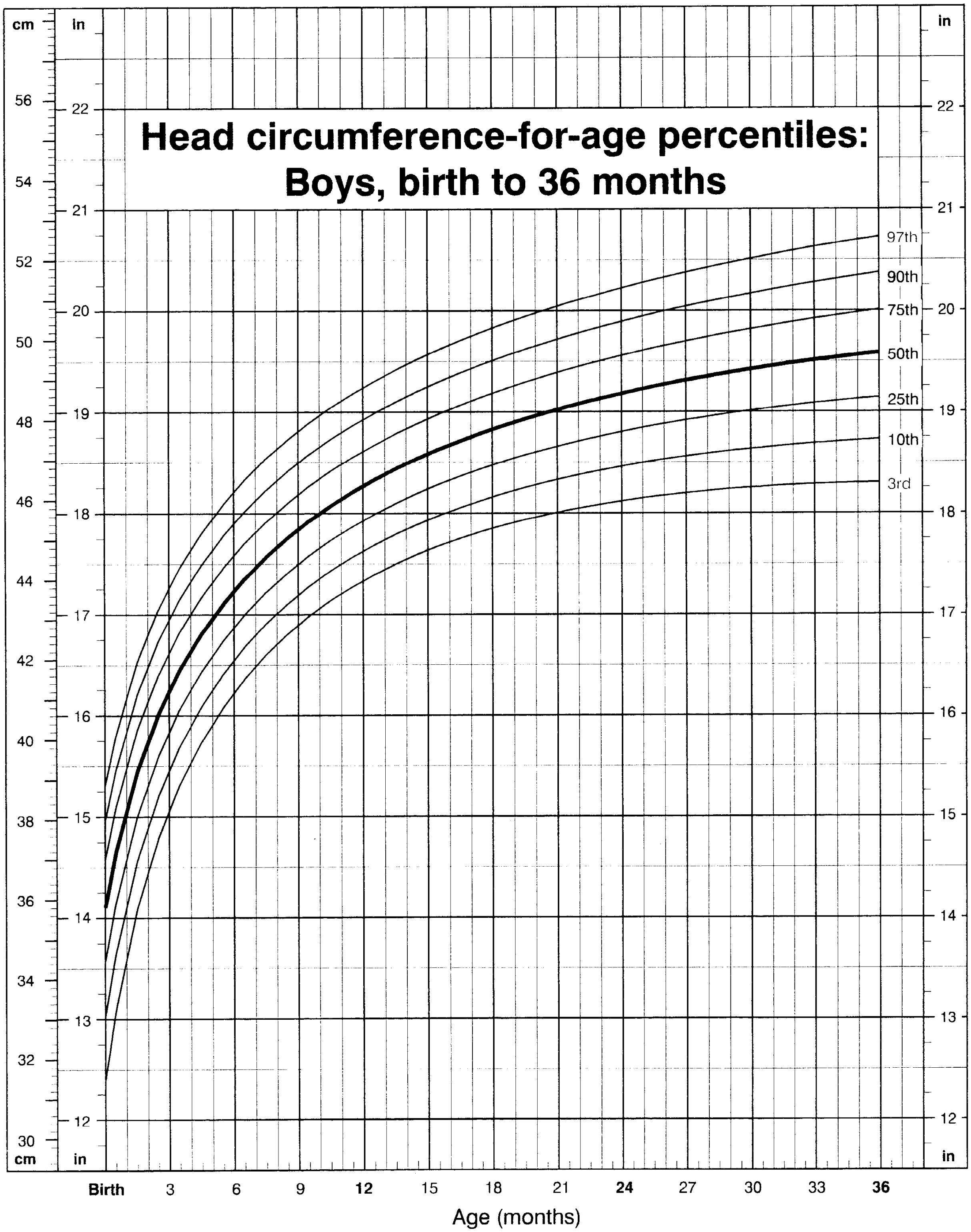

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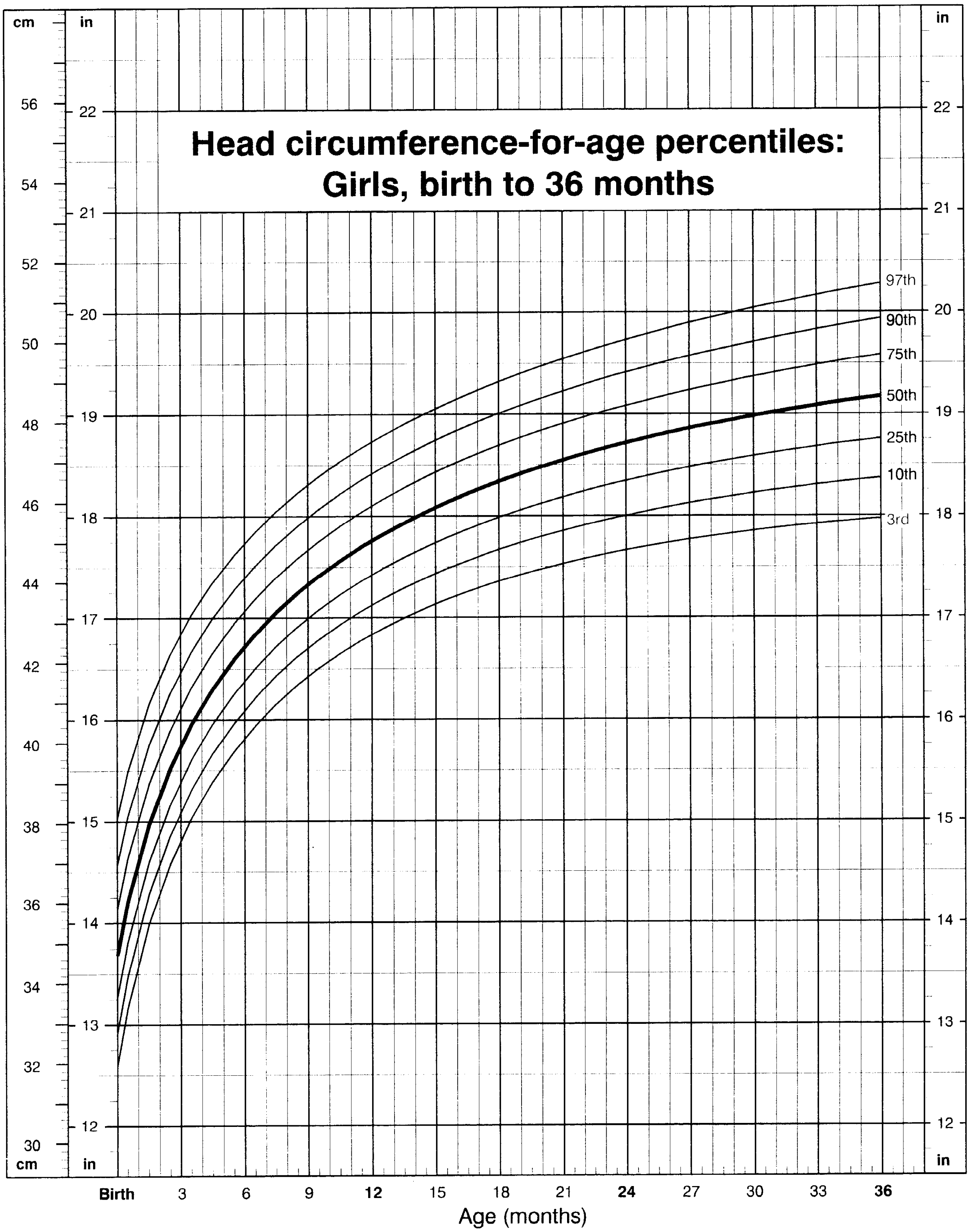

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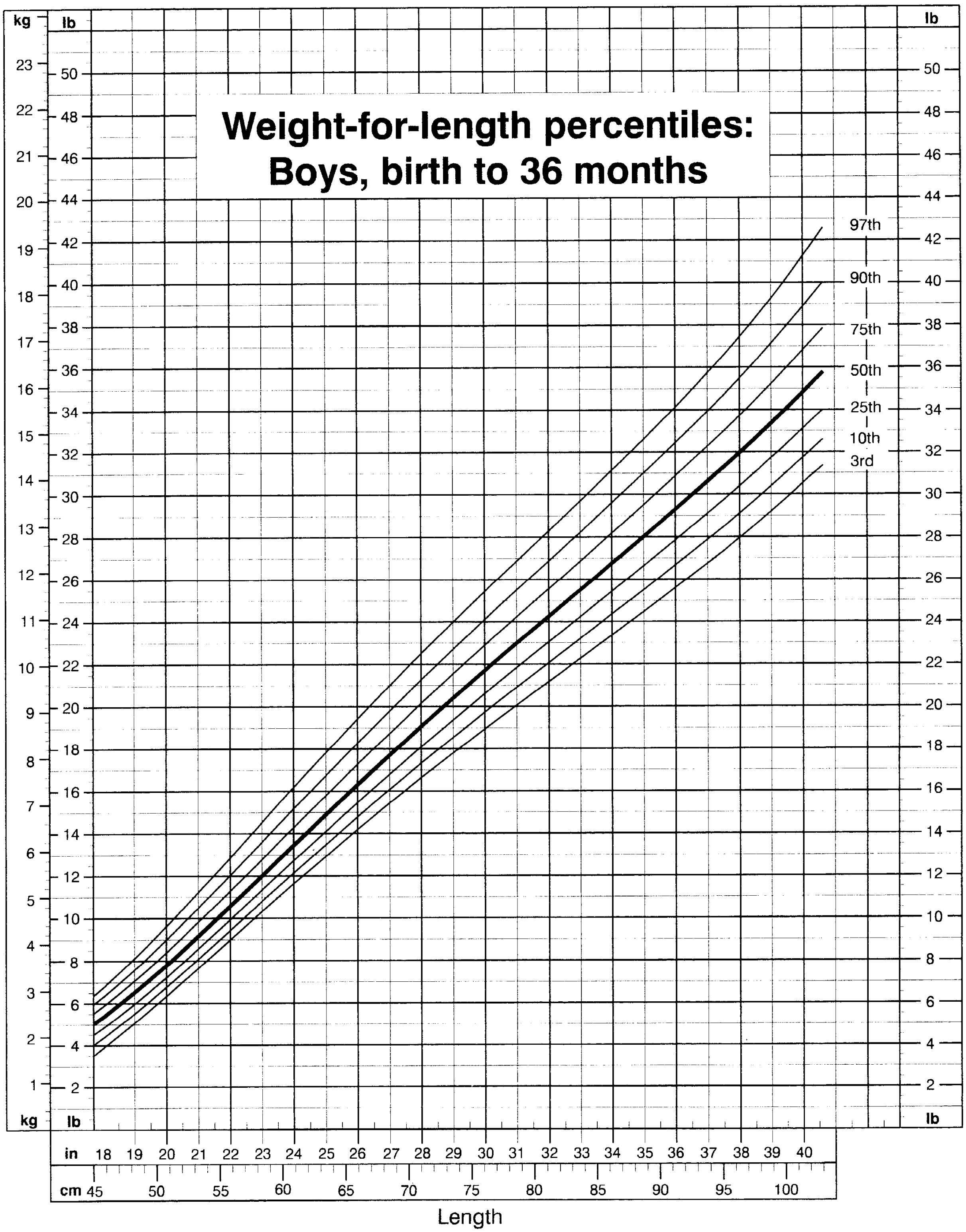

Revised and corrected June 8, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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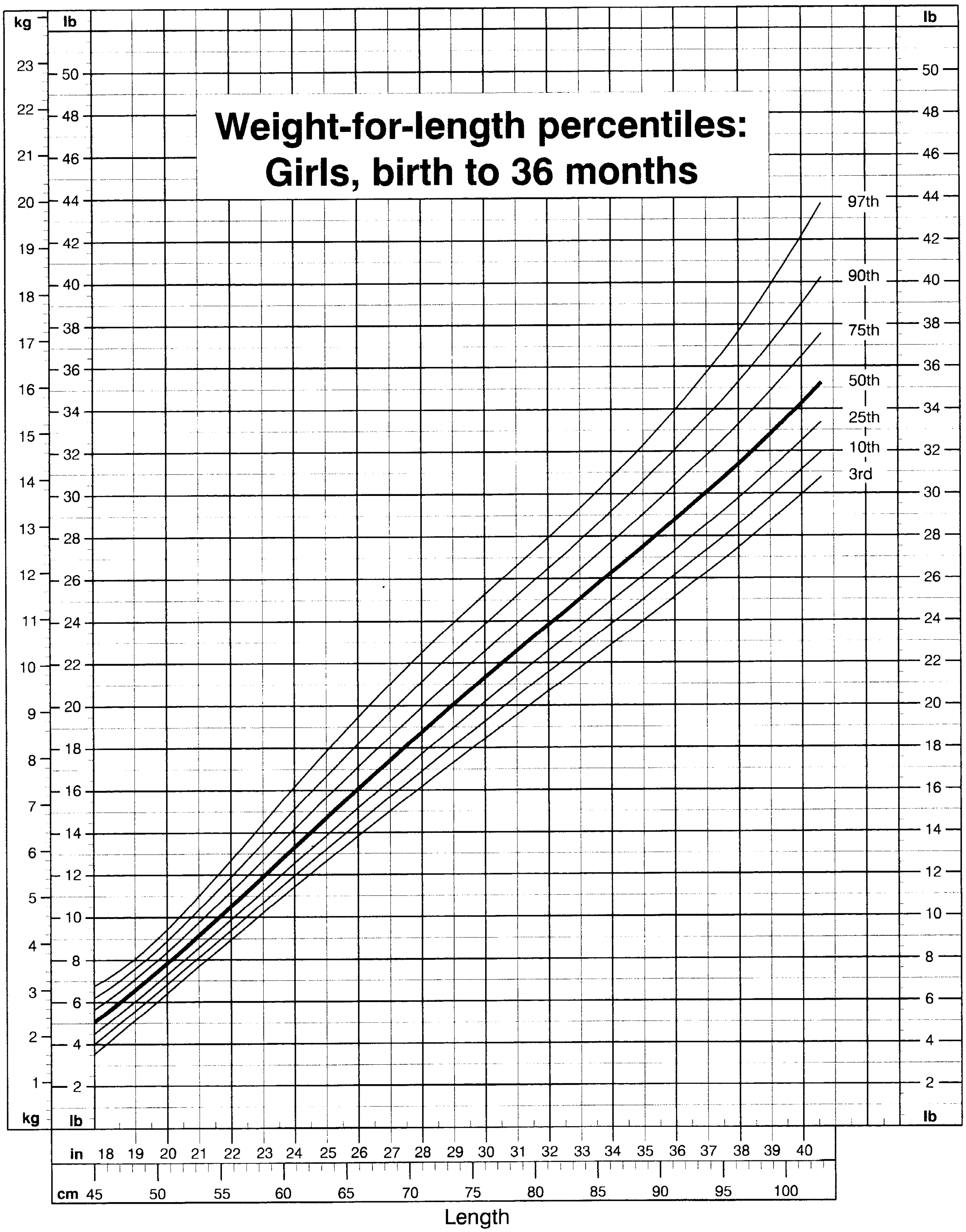

Revised and corrected June 8, 2000.

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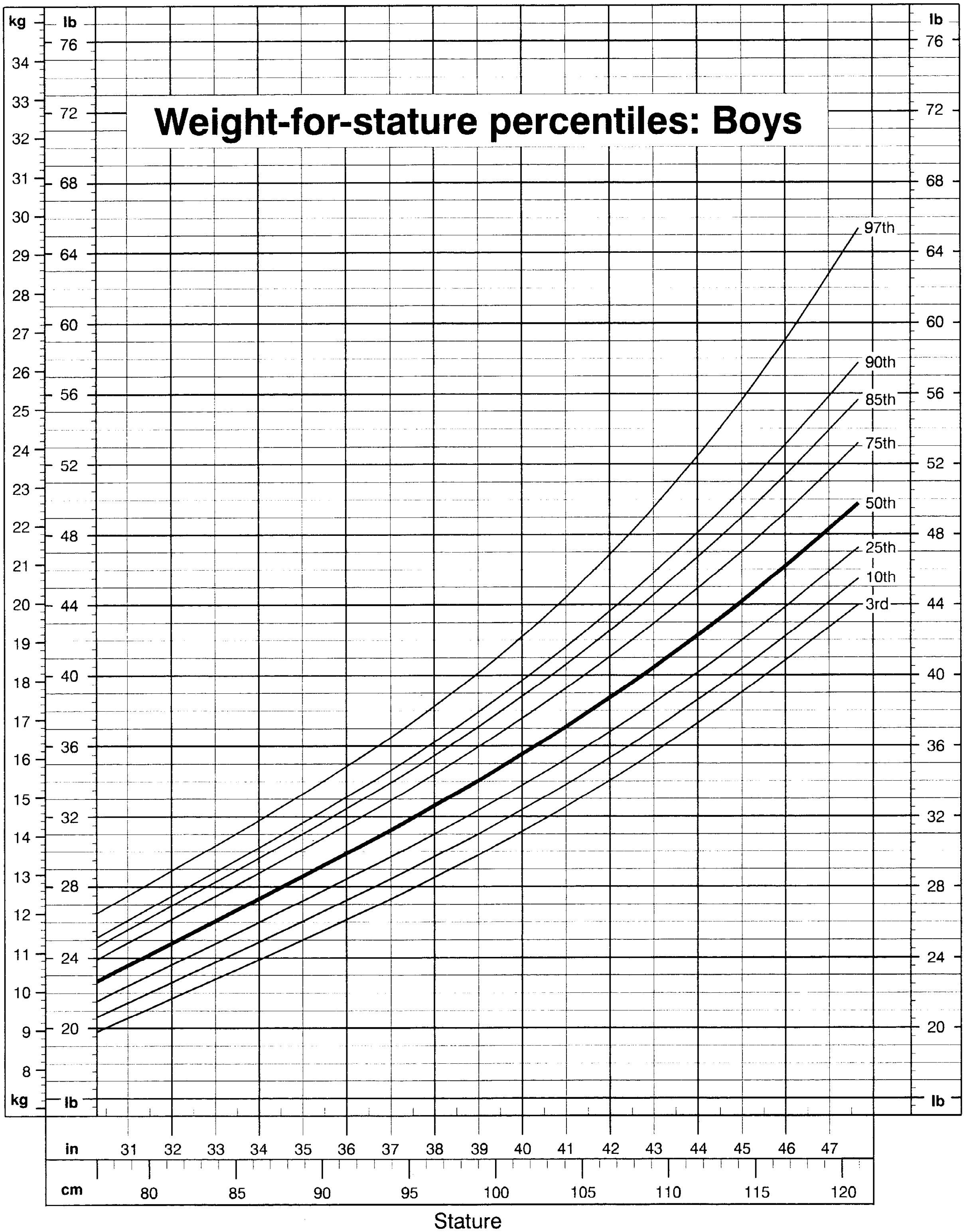

Revised and corrected November 21, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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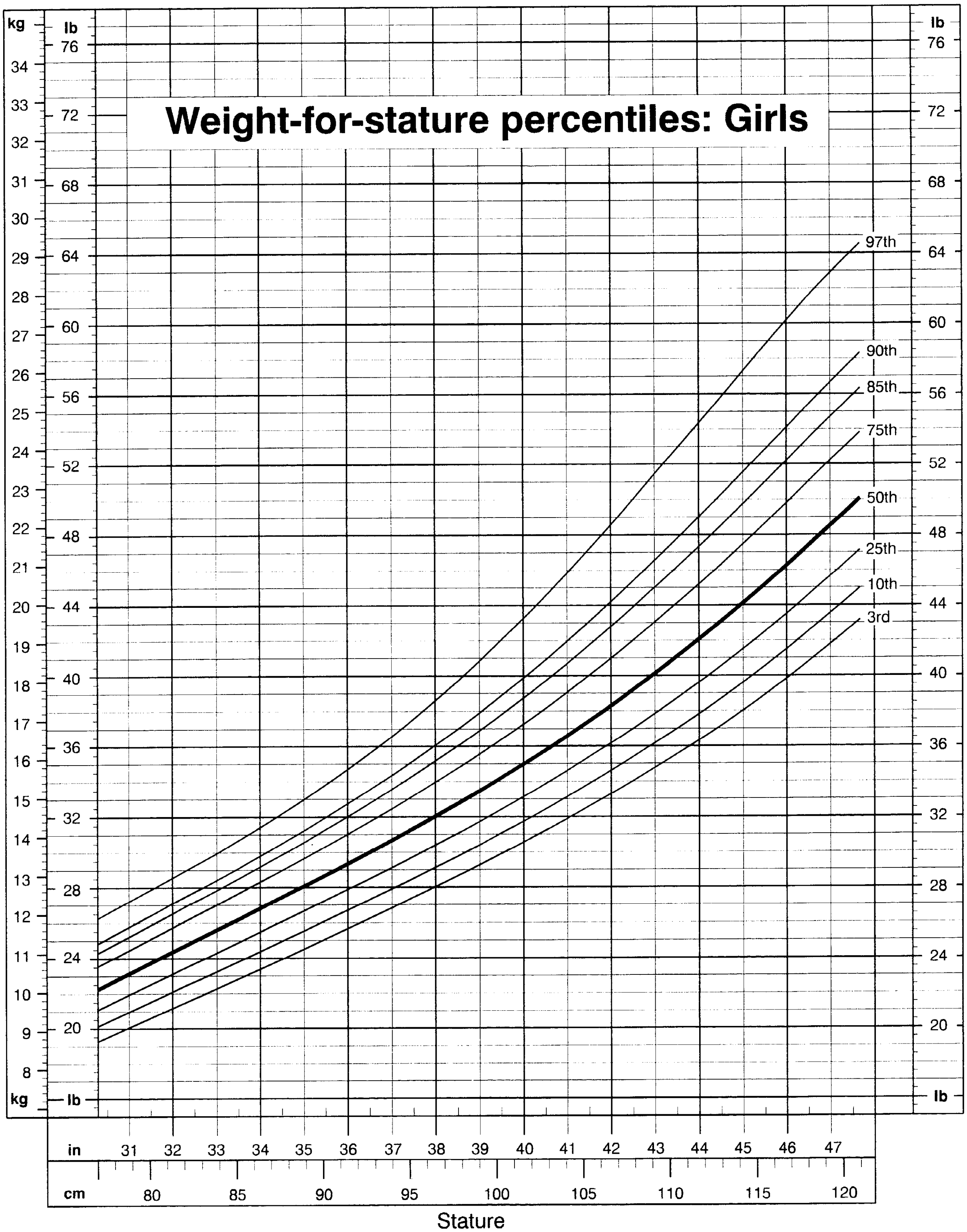

Revised and corrected November 21, 2000.

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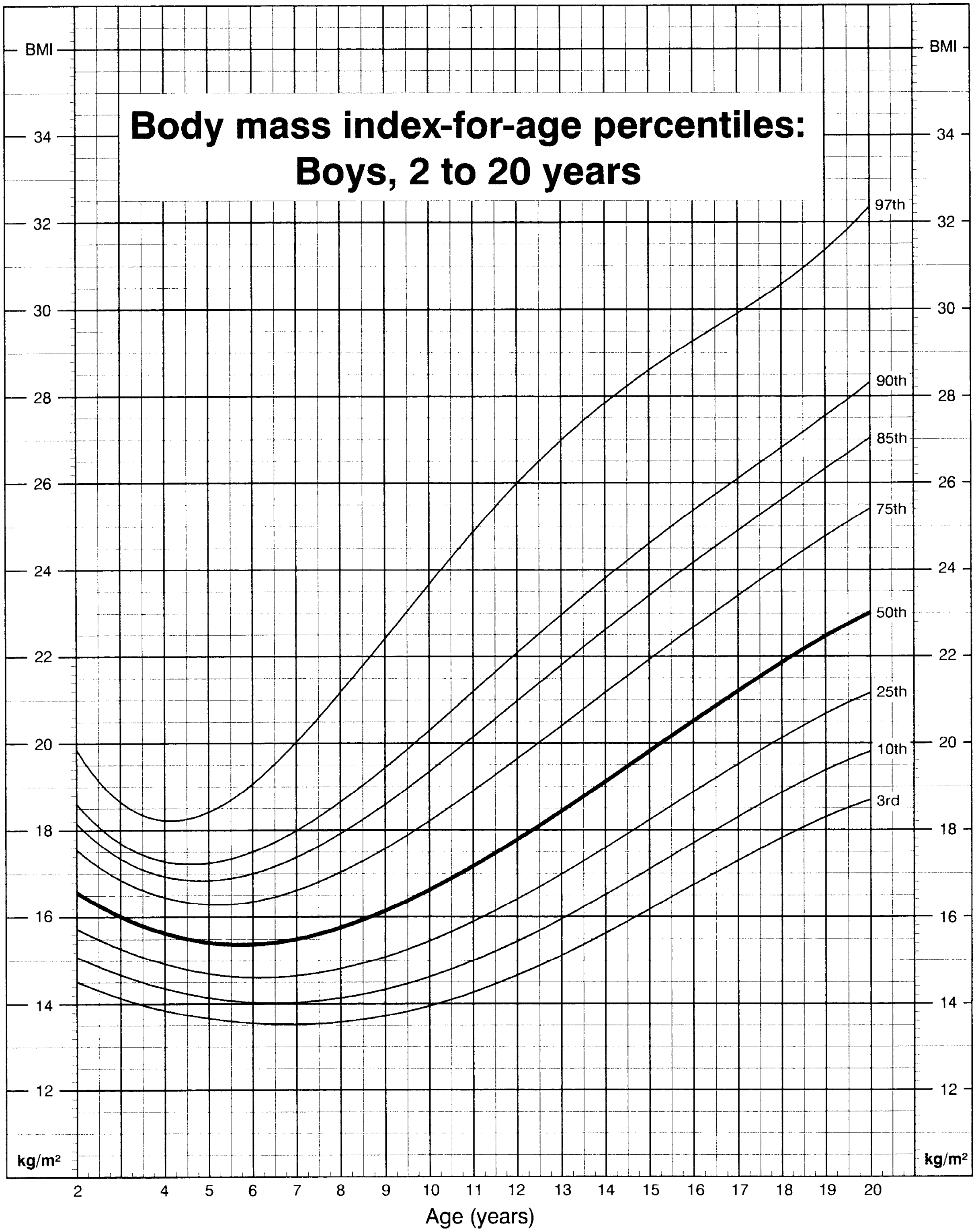

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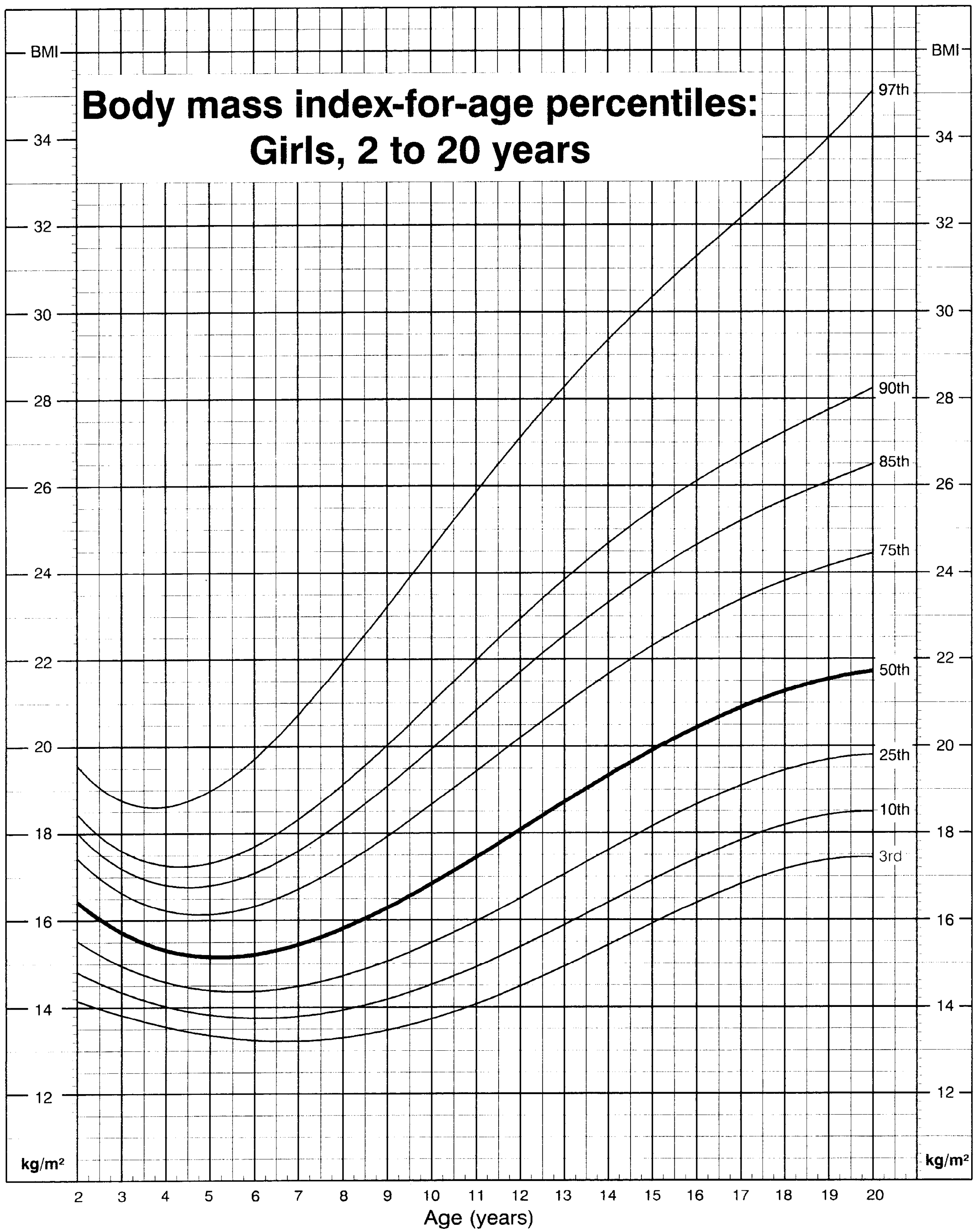

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